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THE OUTLOOK FOR DAIRYING.*

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The dairying outlook has never been more promising in the history of the industry than it is at present. This is due to the disorganization in Europe owing to the war, and the decimation of herds there as a result of the demand for meat and the scarcity of fodder. Consequently, there is now a great shortage of dairy produce in the thickly populated European countries, and it seems certain that the supply will for many years be unequal to the demand. In the meantime, markets formerly catered for by these European dairying countries will, of course, be short of supplies, and prices will be high. Those engaged in the industry here should, therefore, take advantage of this opportunity to extend their markets, and also strengthen our hold on those where it was formerly insignificant.

It would appear, from the diminished surplus in Australia for export during the present season, that dairymen are not fully alive to this opportunity. On searching for causes, one is forced to the conclusion that, high as prices have been, the industry has not been as attractive as others for which land suitable for dairying may be utilized. Owing chiefly to the scarcity of labour, stock-raising for wool and meat has been resorted to, and country formerly used for dairying has been diverted to the carrying of sheep. The scarcity of suitable labour has been responsible for considerable areas being abandoned, particularly in Gippsland. The inroads of bracken and rabbits, the cost of wire-netting, and the dairy farmer's usual requirements, coupled with the scarcity of suitable labour, left some farmers unable to carry on. These disabilities were accentuated by the continual regulation of prices for dairy produce. If there had been no regulation of prices whatever, the cost of butter and cheese to the consumer in Australia would not have been materially

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different from what it was during the last four years. At times, the price per pound would have been a little higher, and on other occasions it would have been lower. The attention concentrated on dairy products has had a most disheartening effect on most people engaged in dairying. This cause alone was sufficient, in some instances, to bring about its abandonment, and the diversion of land to the raising of meat and wool.

Prior to the era of price-fixing and controlling, the price of butter and cheese during the export season was determined by its value for export, and during the rest of the year it was regulated by the law of supply and demand. Usually no shortage was experienced in the off export season; producers were content to do all they possibly could to meet the demand, and although dairying at this season seldom paid as well as operations in the spring months, the slightly higher prices ruling were considered sufficient inducement to continue the work during the late autumn and winter months. The fixing of prices at, approximately, the same level the year round, has resulted in the concentration of effort on the part of dairymen towards production during the spring and summer months only, and carelessness in the winter time. Every effort is now made to bring an unduly large percentage of the herd into profit in the early spring. Sufficient fodder is not provided for the slack period, and cows are permitted to go dry, though with a little trouble they might have been kept in full yield. Now that the war is over, it is to be hoped that dairymen will be allowed to carry on and develop the industry without the special restrictions of the recent few years.

Dairymen can, of course, do a great deal to help towards improving their own position. Numerous object-lessons may be found in every district. Many are getting good returns from their herds, and making a profit. Naturally, a little observation is necessary on the part of those not so fortunately circumstanced to ascertain the reason and take steps to achieve similar results. The successful man, in the first place, makes sure that only good dairy cows which are well bred from a dairying point of view are kept, and that any animal not reaching a profitable standard is discarded. He sees that a plentiful supply of food is provided for his herd, and that any surplus is preserved for use in less abundant periods.

Seasons may be quoted to show what an important part food supply plays in production. In 1911, early summer rains fell, and were continued so as to provide a second spring; the result was a record production in butter, with a surplus for export amounting to over 25,000 tons, without any increase in the number of cows engaged in dairying. We have had a similar lesson recently, when a good general rain stopped the necessity for withdrawing reserves put by in cool store for the Winter Pool.

Another illustration may be used from an imported source. In a despatch recently received from the Agent-General, he says:—

> "Our Copenhagen correspondent, writing under date 29th January, writes:—'It is reported from agricultural circles that there is again a shrinkage in the production of milk and butter. The Co-operative Association paper brings the news, on best authority, that an offer of 50,000 tons oil-cakes has been received from America, but in any case it will take two months to bring them here.

Fertilizers are now offered us abundantly, so by-and-by our agricultural industry should revive. In the meantime, our exports are next to nothing.'"

"Our Copenhagen correspondent, writing under date 5th February, states:—'Butter is coming very sparingly forward from the dairies, nevertheless we have had some for export, mostly to Sweden. The cows are fed principally on turnips, and the yield of milk is down to about half of the normal. Licences for maize and oil-cakes from America have now been obtained, but it is still uncertain when these goods may arrive. Until then, the production of butter cannot be increased.'"

These reports show that at present the exports from Denmark are next to nothing, and the production of butter in that great dairying country cannot be increased until suitable cattle feed is imported from America. That the yield is down to about one-half of the normal, shows that even in Denmark—the greatest dairying country in the world for its size—large returns from cows cannot be procured without suitable feeding; and, furthermore, that they are unable to provide all the stock food required by them in their own country.

Better attention to breeding, selection, feeding, and management of our herds will result in increasing yields and cheapening the cost of production. This will enable the higher rates for labour and all other requirements of the dairy farmer being met.

You—members of this Butter Factories' Association—can do a great deal in inculcating these principles amongst your suppliers. They are the foundation of the industry, and it is your duty to embrace every opportunity to teach them. If the foundation is neglected, the permanence of the superstructure will be impaired. Our exports of dairy produce will be increased and multiplied if you succeed in inducing dairymen to increase production. In your respective districts you, to same extent, are looked to for guidance, and if you are successful in stimulating those engaged in the actual work of production, the industry will prosper.

Recently great developments have taken place in Victoria in the making of other products than butter from milk. Not many years ago, efforts were concentrated on the production of butter only; now, slightly more attention is given to cheesemaking than formerly, whilst a considerable proportion of the milk is manufactured into condensed, concentrated, and dried milk. Some of the dried milk is further treated and made into infants' food. Large quantities of casein are manufactured from skimmed milk and butter-milk, and during the year one company has also started the manufacture of "milk sugar." Most of the milk turned into these products displaces butter and cheesemaking, proving that it has been more profitable to the dairymen to sell to condensories than to butter factories. In other instances, the products supplement butter and cheesemaking, thereby increasing the dairyman's return where such by-products are manufactured. These innovations extend the horizon of the dairy industry, and a diversity of outlets for the product of any primary industry means its firmer establishment.

Now, concerning the part in the industry with which you are more directly engaged. You will agree that there is room for improvement

in the quality of some of your product. Perhaps most of you are of the opinion that the best article possible is made, having regard to the condition of the raw material when it reaches your hands; this may be so to some extent. Attention to the cream deserves first consideration. How can its deterioration be prevented before it reaches your hands and so enable you to make a first-grade product from it? In many instances, a good deal can be, and is, accomplished by the manager exercising a salutary influence upon their suppliers. These efforts might be crowned by taking practical steps to insure the more frequent delivery of cream, so that it could be received at the factory in a fresh condition. No doubt, many are handicapped, and the provision embodied in the Dairy Produce Bill submitted to Parliament last session would have been of very great help. The grading of cream, and payment for it according to its suitability for making a first, second, or third grade product, forms the key to the whole situation. Whilst a supplier can get as good a price, or nearly as much, for an article delivered once or twice a week and uncared for in the meantime, as another does for that delivered three or four times a week upon which every possible care has been bestowed, the additional trouble and expense incurred by the latter will be undermined. As long as lax procedure is continued on the part of careless suppliers, a prejudicial influence is exerted on those who are disposed to be careful in the treatment of their milk and cream. The percentage of first-grade butter must inevitably decrease in the absence of such legislative remedial measures.

On the other hand, there is room for some butter-makers to improve themselves, and it is admitted that they are handicapped by the lack of educational opportunities. These facilities could best be provided in conjunction with the inspectional work embraced in the Dairy Produce Bill; and it is sincerely to be hoped that this measure will shortly be approved of by Parliament.

The necessity for improving the quality of butter and producing only the best article is as vital to the State as the increase and multiplication of our exports. Our products have to compete in the world's markets with those from other countries where every possible step is taken to insure the manufacture of an article of the best quality. It costs as much to provide cases for a second-grade butter as for a first-grade article. The expense for rail carriage is as much for one grade as the other. The cost for freezing, storage, ocean freight, and all like charges are the same. It will, therefore, be seen that the higher the standard, and the greater the price consequently realized, the lower will be the percentage of expenses incurred in the sending of that article to market.

As well as competing in the world's markets with butter from other dairying countries, our butter will have to meet the competition of increasing supplies of margarine. There is no fear of this competition as far as first-grade butter is concerned. It is only in regard to second-grade quality that the greatest disadvantage will be encountered. The following extracts from a letter recently received from the Agent-General, are instructive:—

> "*Butter.*—The Government control is likely to continue for some time to come. At present, this article is rationed at the rate of

1 oz. per head per week. Supplies have been exceedingly short, but are now coming to hand from Australia, New Zealand, the Argentine, and America in considerable quantities, and it is most likely that the ration will be raised to 2 ozs. within a very short time. The retail price is 2s. 6d. per lb., and it is probable that a reduction of 2d. per lb. will be made shortly.

"The world's supply of butter is short, owing to the decrease in the dairy herds of Denmark and Siberia, the cause of this, in the case of the first-named country, being lack of supplies of feeding stuffs; and, in the case of Siberia, owing to the general disorganization of the country. England used to draw very largely from both these countries for her supplies, and you can therefore see that, as we are not receiving anything at all from these sources, this explains our great shortage.

"It is quite certain that a 2-oz. ration is not sufficient to satisfy the public demand, and that it would not be safe to give butter a free sale until there was an average of 4 ozs. per head per week; and this is not possible until supplies can be obtained from Denmark and Siberia. When this will be, it is, of course, impossible to say; but it is quite possible that if Denmark is supplied with feeding stuffs and raw material for the manufacture of margarine, we might get a small quantity of butter by the autumn.

"*Margarine.*—This article is partially released from control. Up to this week, it had been rationed in the same way as butter, only the quantity differed, the last amount being 5 ozs. per head per week, with a retail price to consumers of 1s. per lb.

"The alterations that have been made now are that the price of 1s. per lb. is a maximum one, therefore retailers can sell at less if they choose, and many of the leading multiple-shop companies have promptly availed themselves of this opportunity by at once reducing the price to 10d. per lb.

"The ration is taken off altogether, and consumers may therefore purchase any quantity, but they are still tied down to the retailer they registered with until 3rd March, when this condition is removed.

"Manufacturers are supplied with the raw material by the Government, and have to conform to a standard fixed by the Ministry. The maximum price they may charge to retailers is 10d. per lb., but it looks as if they are cutting the price in some cases, and it is evident that there is likely to be a big fight all round to secure a large portion of the trade. There is no doubt that sales will largely exceed the rationed quantity, and at present all the margarine is British-made, no imports being allowed."

It will be seen from these extracts that the ration of butter allowed in the United Kingdom was 1 oz. per head, and that it was about to be raised to 2 ozs. per head, whilst the quantity of margarine available allowed a ration of 5 ozs. per head, at much less than half the price. There should be no fear that people will eat margarine in preference to good butter. An extract from a recent letter received by a neighbour from a friend in England is interesting:—

"X——— got your parcel just before she left Mentone, and we have been enjoying the butter so much; it is delicious; and we are

grateful to you and the "Iceberg" brand. The longer I eat the margarine the less I like it, and we are allowed only 1 oz. of butter per week, and that just does for Saturday and Sunday's breakfast. I have enjoyed your butter so much this week."

If there was any period in our life-time when it was necessary to be patriotic, it is now. Our patriotism should take practical shape. In consequence of the war, this country has heavy abnormal obligations to meet. The chief source to which we must look for help will be our exports. After fully supplying the needs of our own population, we must aim at producing as great a surplus as possible of all commodities that can be marketed profitably over-seas. I know of nothing which promises such good prospects as dairy produce. As well as exporting all we can, we must see that the highest market value is secured, and that this principle does not apply to dairy products alone, but to all commodities exported. In the recent past, this has not been the case, and if not remedied soon, the most desirable class of population—rural producers—will be deflected to other countries, where they are permitted to secure full market value for their products, and capital which should be invested in our country areas will find investment elsewhere.

There has never before been such an opportunity as the present, and never before has the necessity to increase our dairying industry been so imperious. If this extension is to take place, there are three essentials that the farmer must look to. They are the improvement of herds, better attention to feeding, and the manufacture of dairy products of the highest value, while the sale in the best markets is needed in order that those engaged in dairying may receive full reward for their labour, and be induced to remain in the rural districts, and thus help to stem that tide of population from the country to the city.

IN-BREEDING.

More than 25,000 guinea-pigs have been reared by the United States Bureau of Animal Industry on one of its experiment farms to test the effects of in-breeding. Brother and sister have been mated in each generation, and some of the families have reached the seventeenth generation. While a few strains have run out, others are nearly as vigorous as are the control families. But the important fact is that there is no general deterioration; the various defects that have appeared are not co-related. One family becomes strong in one respect and weak in another; in a second family conditions are exactly the reverse. Such a state of affairs does not lend any support to the popular idea that in-breeding necessarily produces degeneracy. The various kinds of deterioration are to be accounted for in different ways. In general, the belief of scientists is apparently confirmed, that even long-continued in-breeding does not necessarily mean deterioration. It tends to make the members of a family more alike, and to perpetuate all variations that occur. If the strain is a good one, in-breeding will improve it; if it is a weak or defective one, in-breeding will bring the defects into prominence, and probably lead to the elimination of the strain.

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STARTING THE POULTRY FARM.

WHERE, WHEN, HOW.

A. V. D. Rintoul, Assistant Poultry Expert.

For those who have definitely decided to take up poultry farming as a living, answers must be given to the following questions:—

1. Where to start.
2. When to start.
3. How to start.

In considering "where to start," the questions of locality and soil must be borne in mind. While it is not suggested that any one locality is undoubtedly the best, it must be recognised that proximity to a railway station means reduced haulage of foodstuffs on the one hand, and in the marketing of produce on the other. The suitability of the climate must be considered. For instance, in the bulk of the northern parts of this State, *i.e.*, the hotter districts, lack of ample water supply means no green feed during the summer months, and green feed forms 50 per cent. of the birds' diet. Further, the heat itself means eggs with thinner albumen, with consequent reduction in price. Next to suburban eggs, the best prices are always paid for cool district eggs.

As regards soil, sandy soil is the best for poultry, and heavy clay should be avoided. The advantages of sandy soil are several—

(*a*) being warmer the chickens develop quicker with consequent saving or both food and time.

(*b*) a lighter, and so cheaper class of horse can be used for any cultivations that may be required.

(*c*) On this class of soil the weather conditions can be almost entirely ignored, and the land worked any time of the year.

(*d*) With water and manure green crops can be grown all the year.

It is, of course, utterly absurd to suggest that an ordinary poultry farmer should attempt to grow any cereal crops. The principal grain fed to poultry is wheat, and one has only to realize the heavy cost of equipment on a wheat farm, and recognise the comparatively low return per acre, to see the impracticability of the suggestion.

The average consumption of wheat on a poultry farm is about half a bushel per bird, so that an 800 to 1,000 bird plant would require 400 to 500 bushels of wheat per annum, whereas from 2 to 5 acres are ample to accommodate satisfactorily the number of birds stated, allowing ample range for growing stock.

When to Start.

At the present price of foodstuffs, as compared with the market returns for chickens, a man could not make a proper living by depending on rearing birds for table purposes. Egg production should, therefore, always be looked upon as the main objective. The best prices for eggs are always obtained in the autumn and winter months, March, April, May, and June, in consequence of which the pullets should be hatched out so as to come on, lay, and be in full profit during that period. The time to start for the most successful result means having the breeding

pens ready to hatch out chickens for winter laying, the exact dates depending upon the breed used, the climatic conditions, and methods of the people doing the rearing work. The heavy breeds being slightly slower in reaching maturity require to be hatched out two or three weeks earlier than the light breeds. July, August, and part of September will, in most places, be the best hatching dates for the heavy breeds. Too early hatching may mean a false moult when the colder weather sets in, although these birds may be safely used as breeders after being twelve months old, whereas the late-hatched bird is slower in reaching maturity, does not lay until the price of eggs begins to fall about mid-June, and never makes a satisfactory breeder.

How to Start.

It may be definitely stated that for successful poultry keeping there is no such thing as a "best" breed; if sufficient care and attention are paid to any breed they can be worked up to about the 300-egg mark.

Laying strain is far more important than breed, and the question of "selection" will be discussed later.

There are virtually three ways of making a start.

1. Eggs.
2. Baby chicks.
3. One or more breeding pens.

Any of the foregoing methods will give good results provided that the buyer is prepared to ask for, pay for, and see that he gets—the best.

Many of the prominent breeders issue catalogues of prices, and eggs can be bought at almost all prices from 20s. each, down to about 4d. each. These prices represent the seller's valuation of his own stock. Should the buyer, therefore, grumble if the birds from the 4d. eggs do not give high records? The same reasoning applies to baby chicks, which can be bought from as low as 9d. or 1s. each *and upwards*. The beginner is urgently advised to get a few of the "upwards," in preference to numbers of comparative low-grade chicks.

In purchasing stud pens, it is again far better to start with a very few "top-notchers" than to buy a lot merely because they are cheap. However, price alone may not in every case denote the actual quality, as at times breeders have various reasons for selling, or wishing to retain certain stock. There are a large number of thoroughly reliable breeders, most of whom are from time to time represented in public competitions, so that the novice is not entirely dependent upon advertisement to determine from whose stock to select.

Concerning Pedigrees.

Certain terms used at times somewhat loosely regarding pedigrees are apt to confuse or mislead the novice. Eight or ten birds, of perhaps varying pedigrees, may be bred together with a certain cockerel. All the chickens from this mating are branded with the same toe punch. One pullet may be subsequently sent to a competition, and perform creditably, when all the others of the same punch are sold as brothers and sisters, or sometimes as full brothers and full sisters.

In the opinion of the writer it is a clear duty for the National Utility Poultry Breeders Association to deal firmly with this matter. The use of the term "full brother" or "full sister" should be only applicable

where the progeny are from the same individual mother as well as by the same father, failing which the term should be disallowed. It would, perhaps, be of benefit if all registered breeders annually recorded their punches and brands.

It is infinitely better for the beginner to start with half-a-dozen of the best than to commence breeding operations on a much larger scale with more or less moderate quality stock, and an advantage in favour of buying stud stock in preference to eggs is that stud eggs may then be produced on the farm instead of being sent by rail. Another point is that the stud birds may last for several seasons.

A question frequently raised is "how many pullets can be raised per breeding hen?" The best way to arrive at an answer is to assume that 60—65 chicks will be hatched per 100 eggs set down, and after allowing for deaths, culls, and the fact that half the mob will be cockerels, the breeder should raise 25 pullets. In other words, he may count on getting one pullet for every four eggs set, and as the breeding hens will generally lay four eggs per week, one pullet per week per stud hen should prove a slightly conservative estimate. The age of the stud stock is of some importance. It is not desirable to breed from birds during their first laying season until they are fully matured, which means to say, not until the birds are twelve months old, and then only provided that they possess sufficient stamina. Many a promising flock has been ruined by continued "pullet" breeding, with subsequent degeneration and loss of size and vigour. It is also preferable that the male bird be either a year older, or younger, than the hens he is mated with.

It has frequently been found that for competition purposes some excellent layers are obtained from very early hatched pullets (fourteen months' old) mated to a twelve-month cockerel, but the percentage of culls is usually high, and this mating is not recommended except in the case of experienced breeders who thoroughly understand their business.

The beginner is also apt to make the mistake of buying a fresh cockerel every year from a different breeder "to get change of blood." Provided that he has received satisfaction in the first instance, he would be better advised to patronize the same breeder, as the breeder himself has to make certain changes in his matings, and so is in the best position to supply cockerels likely to suit stock supplied in previous years. The reliable stud breeders keep very careful records of their various blood lines, and so know what is most likely to suit their own stock.

LINE BREEDING.

Line breeding is described by Mr. H. R. Lewis as the breeding of individuals which are selected from, or restricted to, a single line of descent; being the process of breeding within one family or within a limited number of families, all of which have a common ancestry, and represent similar types. The result is the rapid purification of the pedigree and the fixing of a type. There are two advantages (1) a greater certainty with which results may be obtained, and (2) the progeny of line-bred birds are backed up by strong hereditary influences. The weakness of this system is shown, however, when the matings are effected by means of a chart alone, without the most careful examination being made to see that stamina is being conserved.

A quite usual mating is the father to the daughters, also a son back to the mothers, giving either three-quarter male, one-quarter female blood on the one hand or *vice versa*. As the laying propensity is recognised as being handed down from the son of a heavy laying hen to his daughters, the advantage of pedigree will be at once recognised. It is the present opinion of the writer that "in-breeding" is more necessary in the case of the male than that of the female.

On a well-known poultry farm in this State the following matings were arranged between A and B, unrelated (bought) males and Y and Z, unrelated females:—

A was mated with Y, and B with Z.

The progeny from both these matings achieved considerable success in competitions.

The second year a cockerel A-Y was mated with Z, and another B-Z, was mated with Y.

The third year a cockerel A-Y x Z was mated with a pullet B-Z x Y, and a cockerel B-Z x Y was mated with a pullet A-Y x Z.

The result was instructive and interesting. One of the pullets from the (A-Y x Z) x (B-Z x Y) mating was exceptionally large and robust, and in a private test laid neary 300 eggs.

A cockerel from the (B-Z x Y) x (A-Y x Z) mating was placed with unrelated birds, and one of the pullets from this mating is performing exceptionally well in one of the current competitions.

Unfortunately, the inner history of the pedigree of competition birds is all to rarely known to the departmental officers, and, consequently, much reliable data escapes unnoticed.

"PICKING THE WINNERS."

Whilst there is no definite method whereby it is possible to forecast the actual number of eggs any bird will lay in a given period, experience will undoubtedly enable the poultry breeder to select his best pullets for testing, and also his best hens for the breeding pens. It should be borne in mind that, while the egg-laying competitions have demonstrated, and developed, the remarkable fecundity of the various breeds, birds should never be mated on figures alone. Merely because a hen has tested up to, or beyond, the coveted 300 egg mark does not finally stamp her as a desirable breeder—she may be undersized or undesirable in some other way—and it is necessary that the weight limit be rigidly adhered to, to prevent deterioration.

Attention must also be paid to type, although the question of type admits discussion. The standards of perfection for most of the breeds were fixed years ago, when 200 eggs from a hen in a year were not looked for, and a total of 250 eggs was considered impossible. These standards were fixed by men interested in poultry from the exhibition point of view for birds that got scant opportunity for demonstrating their laying abilities, being travelled from one show to another and in the interim treated, fed (and at times faked) for condition, plumage, &c. The time has now come for carefully considered discussions between those interested in birds solely from the exhibition stand-point and those equally interested from the purely egg-laying point of view. In some cases concessions may have to be made by both sides. For

example, there are other points besides colour in the Rhode Island Red, and because a bird has black feathers she is not necessarily a Black Orpington. Yet in the case of some of the birds entered in recent competitions it would appear that some such quality was in itself the owner's accepted standard. It is agreeable, therefore, to note a distinct improvement in the type of birds entered this year in the Burnley competitions.

Activity in birds is always a good indication. Those first off the perch in the morning are the last to retire at night, and after foraging and scratching about all day they go to roost with full crops.

During the past few years the practice of handling birds to determine the amount of abdominal development, quality of pelvic bones, &c., has become general throughout the State, and whilst this is of some value to the experienced breeder, it is to a certain extent a handicap to the novice, who may fail to make due allowance for condition as regards moult, or lay, and consequently reject a really good bird.

About a couple of years ago the writer, by way of an experiment, went through a shed containing between 500 and 600 White Leghorns after 11 o'clock one night, selecting about 70 or thereabouts in the dark on "handling" alone. These were put aside in a smaller shed, and re-examined again at dawn. The result was an instructive failure, as owing to various defects (constitution and other points being purposely overlooked in the over-night handling) barely half were subsequently put in the breeding pens. Fully 75 per cent. of the value of the bird must be decided by inspection "on the ground," the remaining 25 per cent. being ample to allow for the handling test.

The following standard is recommended for selecting both layers and breeders:—

GENERAL APPEARANCE.—Bright, active, and healthy. The first essential a well-developed vigorous constitution, giving evidence of ability to transmit similar qualities.

HEAD.—Rather long in light breeds, and lean, narrowing somewhat at the back of the skull. Heavy breeds proportionately shorter in length of skull, but fractionally deeper.

EYES.—Full, round, prominent, and bright. Colour rich orange red, except in the case of certain breeds, such as Black Orpingtons, Minorcas, Langshans, &c., when the eyes should be such a dark brown as to appear black. The space from eye to nostril, particularly in heavy birds, should be short, so as to present "shrunken face."

FACE.—The skin round the eye should be bright and clean and as free as possible from face feathering.

COMB.—Thin, and fine in texture, thickening as little as possible towards the base.

WATTLES.—Thin, and of the finest possible texture.

NECK.—Fine, and fairly long.

BODY.—Long, deep, and wedge-shaped, similar to that of a good milch cow, wide across the saddle.

BREAST BONE.—Straight and fine.

PELVIC BONES.—Thin, pliable, fairly long, and straight, set at considerable distance from point of breast bone.

SKIN.—Texture of skin of abdomen to be of thinnest and finest quality, very elastic when in full lay.

LEGS.—Flat in bone, not high, and set very wide apart.

TAIL.—Full and flowing, not set at too high an angle, with long sickle and hackle feathers.

FEATHERS.—Profuse, but close and flat on the bird.

WEIGHT.—Six months pullets, White Leghorns, 3½ lbs.; 6 months pullets, Black Orpington, 5 lbs.; and others in proportion.

To condense the foregoing points it may be stated that the bird should appear bright and alert, show strong constitution with a deep body and well-sprung ribs, flat bone in the leg, fine texture in comb and wattles; she should be light in feather, and last, but by no means least, should have round, bright, prominent eyes.

The method of moult is instructive. Most of the best layers will moult slowly, feather by feather, the new feathers working through the old, the bird thus maintaining her lay throughout. For two reasons the full-moult bird cannot be expected to lay during the moulting season. One is that a greatly increased quantity of the food consumed is required to maintain the body temperature through lack of feathers, and the other reason is the drain on the system to renew the entire feather supply all at the one time. Consequently in a flock the bare red-headed birds that moult late and slowly should always be distinctively leg-banded. They are invariably hard in feather, and may retain one or two of the wing-flight feathers for a long time. The necessity for space from the breast bone to the pelvic bones in full lay is to denote abdominal capacity. If this capacity is lacking there is not room for a number of yolks to be developing at the same time to maintain an almost daily output of eggs. Crooked breast bones usually denote constitutional weakness, and any bird with such a defect should be discarded, unless the breeder is quite confident that the dent is the result of the bird's perching when too young. The foregoing hints for selecting good layers and breeders of layers apply to all breeds, and the general public should bear in mind that the question of breed is, after all, of far less importance than laying strain.

It so happens that great attention has been paid to White Leghorns, and more recently to Black Orpingtons, *but the breed is not the whole reason for* the high scores these varieties have made in competitions. Certainly six white Leghorn pullets have yielded 1,699 eggs in one year at Burnley competition, and a Black Orpington pullet has laid 335 eggs in the same period, but if breeders will pay as much attention to careful selection in other light or heavy breeds, there is no real reason why the records of the White Leghorns and the Black Orpingtons should not be equalled or excelled. The ability to lay large numbers of eggs is not confined to two breeds, and that is why the Department of Agriculture offers inducements at the competitions in the shape of additional sections to encourage the development of the laying capabilities in other strains. At an unofficial competition a Buff Orpington has laid over 300, and a Faverolle 298, and this latter breed is a most useful farmers' fowl, being strong, hardy, and quick growing.

SUGAR BEET INDUSTRY.

Report of Juiceries Committee.

The committee appointed by the Minister of Agriculture to consider the question of the practicability of the establishment in districts remote from the Maffra Sugar Factory of juicery plants for the extraction of raw sugar from beet, which could be sent to Maffra to be refined, has presented its report.

The committee consisted of Mr. J. J. Pascoe, Agricultural Editor of the *Weekly Times* (chairman); Mr. A. N. Pearson, who had suggested the juicery system; Mr. D. Avery, Industrial Chemist; Mr. J. R. Johnson, of the Tyne Foundry; and Mr. W. L. Williams, Manager of the Maffra Factory.

Mr. Pearson failed to agree with his fellow members on the question of the advisableness of establishing juiceries, and submitted a lengthy minority report, giving his reasons for urging their formation.

The following is a copy of the committee's report:—

We have the honour to report, in accordance with your instructions, that we have carefully investigated the proposals made by Mr. A. N. Pearson, formerly Chemist for Agriculture in Victoria, to establish juiceries as adjuncts to the Maffra Beet Sugar Factory.

Recognising that such juiceries, if practicable, would greatly foster agricultural development, we have examined the proposals from two points of view:—

1. Is it technically possible to arrest, midway, the processes of manufacture so that, by means of evaporation, dried juice could be produced in a condition capable of being held for a lengthy period and of being transported over considerable distances to a central factory for refining?

2. Would the operations at a juicery, undertaking such extraction and evaporation, be a commercial success?

At the outset the technologists on the committee conceded the point that beet sugar juice could be evaporated to dried juice without material loss of sugar. Moreover, Mr. Pearson supplied a convincing illustration. With an experimental plant constructed from his own designs as an engineer, and operated at Port Fairy and Bacchus Marsh in 1894, he (*a*) by hydraulic press extracted from 75 to 85 per cent. of the sugar contained in beet roots; (*b*) evaporated the water from the juices: (*c*) transported the raw sugar so obtained long distances; and (*d*) kept it without serious inversion for different periods extending to three years. We, therefore, unhesitatingly conceded the point as to the scientific feasibility of Mr. Pearson's proposals.

In examining the commercial aspect of juiceries, consideration was concentrated upon (*a*) Cost of buildings and plant: (*b*) manufacturing costs; and (*c*) probable revenue of the juicery obtained from the price paid for the dried juice by the Maffra factory, and the price the juicery would be likely to receive for the by-product—pulp.

The increased costs of plant, fuel, stores, and labour under existing and probable post-war conditions, rendered it necessary to greatly amend estimates of expenditure based on Mr. Pearson's demonstrations in 1894.

Obviously the cost of producing dried juice and delivering it to the factory is greater than the cost of producing the equivalent juice in the factory itself, for, in addition to the operations necessary for the extraction of the juice which are more or less common to juicery and factory, there is in the case of the juicery the cost of evaporation, freight of dried juice to the factory, depreciation of bags, &c., none of which occur in factory operations.

The normal campaign of the Maffra factory, in addition to ordinary manufacturing costs, has to provide out of its revenue for interest on the capital, depreciation, repairs, and certain general expenses for the whole year. If, therefore, the establishment of juiceries provided a supply of dried juice which would keep the Maffra factory employed for some part of the present idle period, and produced proportionately the same revenue in the additional campaign, there

would be a much greater profit, owing to the fact that, in the additional campaign, these standing charges would not again have to be paid.

The additional campaign would, however, necessitate some additional repairs, depreciation, &c., which would have to be allowed for.

During the campaign of 1917-18 the Maffra factory treated 14,487 tons of roots, and out of revenue paid the following amounts:—

Repairs	£3,125
Interest	3,256
Depreciation	2,528
Office management	2,378
	£11,287

and showed a profit of £1,867. These sums covered, of course, the whole year, 1,650 tons of finished sugar being manufactured from the roots treated. The bulk of the revenue is thus absorbed by standing charges. If the output of the factory were doubled, these charges would be only slightly increased, while the profits would be disproportionately greater.

The point is developed in the following figures. The second campaign, working on the dried juice, would occupy as long as the first:—

	£ 1917-18 Campaign.	£ Additional Campaign.	£ Difference.
Repairs	3,125 ..	1,450 ..	1,675
Interest	3,256 ..	— ..	3,256
Depreciation ..	2,528 ..	— ..	2,528
Office and management	2,378 ..	700 ..	1,678
	£11,287 ..	£2,150 ..	£9,137

Of the profit of £1,867 made in 1917-18 campaign, £500 represented proceeds from the sale of pulp. This would not be available in the dried juice campaign, so that, other things being the same, its profit would be less, or £1,367. Thus in a second campaign there would be available £9,137 surplus revenue, and £1,367, or an aggregate of £10,504. On a final yield of 1,650 tons of sugar this represents £6 7s. 6d. per ton of sugar.

Exclusive of charges for interest, depreciation, and repairs the cost of manufacture to the juice stage at Maffra in the last campaign has been estimated at £13 8s. per ton crystallized sugar. Hence if an additional campaign were carried out without profit or loss to the factory it could pay per ton crystallized sugar in the dried juice £13 8s., plus the difference in revenue. This would be £13 8s., plus £6 7s. 6d., or £19 15s. 6d.

Cost of Producing the Dried Juice.—The committee has been at considerable disadvantage in estimating costs, owing to the fact that no similar plants are in operation, so far as could be learnt, in any part of the world, and, consequently, no comparative figures for plant required, operating costs, &c., could be obtained. The only experiments of which any records are available were those made by Mr. Pearson about twenty-four years ago, and of which the records are incomplete. Consequently it has been necessary to work on estimates which are not wholly satisfactory in that they cannot be based on actual practice. Calculations were based chiefly on costs of corresponding processes at the Maffra factory.

Three types of juicery were considered by the Committee:—

1. *Diffusion juicery* (practically a small plant worked on the same lines as the corresponding part of the Maffra factory), capable of treating 50 tons of roots per day (24 hours), or 5,000 tons per season.

2. *Stationary press juicery* established in local district, capable of treating 50 tons of roots per day (24 hours), or 5,000 tons per season.

3. *Travelling press juicery* to move from farm to farm and operate in somewhat the same way as travelling threshers—capacity 18 tons per day of eight hours, or 1,800 tons per season.

The large amount of capital required for diffusion juiceries rendered them unattractive to the committee, and detailed consideration was concentrated upon

the proposal for a stationary press juicery, tentative operating costs of which are estimated as follow:—

Stationary press juicery, capacity 48 tons per day, season 104 days, with 15 per cent. sugar in the roots and extraction of 84 per cent. of the juice—

	Per Ton Sugar recoverable from Dried Juice. £ s. d.
Beet, 8.66 tons, at 27s. 6d.	11 18 0
Labour	2 4 9
Managing engineer (16s. 8d. per day) during campaign	3 0
Managing engineer (16s. 8d. per day) rest of year	5 10
Supplies	5 0
Interest, depreciation, and repairs	1 2 7
Freight (average 100 miles), depreciation of bags	12 9
Fuel (evaporation and power), coal at 30s.	3 0 0
Total	£19 11 11
Less 1.25 tons pulp, at 10s.	12 6
	£18 19 5
Plus contingencies, at 7½ per cent.	1 8 6
	£20 7 11

(Mr. Williams challenges the basis upon which some of these calculations were made, on the ground that they are lower than can be reproduced in practice.)

NOTES ON ABOVE ESTIMATE.

Beet.—This assumes one ton of sugar extracted from 8.66 tons of roots, that is, 84 per cent. extraction from beets carrying 15 per cent. sugar. Mr. Pearson's experiment extracted up to 85 per cent. with a sugar content of 15 per cent. from ordinary seed. But during his experiments he found that whilst ordinary seed produced 13.97 sugar, selected seed (Vilmorin's Improved and Heine's Improved) grown alongside, produced roots averaging 16.4 per cent. and 17.1 per cent. respectively. He points out that by importing a small amount of such improved seed annually, and growing it for seed production only, sufficient high-grade seed could be obtained locally for the State's requirements, thus assuring richer crops generally. It is noted that last season's crop at Maffra averaged 14.45 per cent. sugar, and required 8.78 tons of roots to produce a ton of crystallized sugar.

Labour.—This estimate is based partly on work at Maffra factory and partly on Mr. Pearson's experimental operations on press extraction.

Managing Engineer.—It would be necessary to engage this man for the whole year. During non-manufacturing period he would supervise and undertake repairs, propaganda, and educational work in his district. No offset has, however, been allowed; his work on repairs could be charged to that account.

Interest, Depreciation, Repairs.—Mr. Williams challenges figures given as being too low. It is difficult to determine what should be allowed for repairs, as no press plant is in operation; but Mr. Pearson, who has worked with his experimental plant, considers the figure is ample. Interest on working capital is charged for two-thirds of the year, on the assumption that this will be returned during the year as payment for dried juice, the Maffra factory similarly recouping itself by sales of finished sugar.

Freight and Depreciation of Bags.—Assuming bags to be suitable for transport of dried juice, freight has been reckoned at the special rate as for beet-root in the Maffra district. The dried juice being a raw product, and the encouragement of the beet industry being the object in both cases, it has been assumed that the same railway rate would apply, viz., 1s. per ton flat rate, and 1d. per ton per mile. The freight has been calculated at this rate for 100 miles, taken as the average distance from Maffra to districts where juiceries might be established. A suggestion that the farmers pay half freight was not adopted for estimates.

Evaporation and Power.—On this item the committee found it impossible come to agreement. Mr. Pearson claimed that with his evaporator he trea 3½ tons of juice per ton of firewood, and estimated the total cost per ton sugar in dried juice to be 17s. 9d., taking firewood at 11s. per ton, and assumin that one-third of the evaporation would be by waste steam from the power plant He also allowed 7 tons of water evaporated by one ton of coal, and, taking coal at 28s. per ton, made a total cost of coal fuel of £1 2s. 6d. per ton sugar.

The committee made extensive inquiries regarding this question, but found it difficult to obtain reliable data regarding the type of evaporator proposed by Mr. Pearson. The outcome of inquiries points to an evaporation efficiency of less than 4 tons of water from the juice, per ton of coal burnt. The discrepancy between the estimate of the committee and Mr. Pearson's figure is of vital importance to the whole question, and Mr. Pearson suggests that a trial should be made with an evaporator, constructed to his design, to be used during the coming Maffra campaign. He is confident that he would be able to prove the efficiency of the evaporator in question.

Pulp.—Mr. Pearson claims that press pulp, owing to its high food value and comparatively low water content, is worth at least 28s. 6d. per ton. This pulp would contain probably 40 per cent. solid matter. The Maffra pulp, containing from 8 to 20 per cent. solids, fetches 2s. per ton. It is admitted that its food value should command a much higher price, but dairy farmers require educating regarding its value, and in the meantime it would not be wise to assume a price that could not be obtained for several years. The committee consider that 10s. per ton is the maximum price that could be generally secured at present. The theoretical amount of pulp is 1.386 tons. This has been taken at 1.25 tons, to make an allowance for loss in handling and drying.

Water has not been charged for. The cost would depend on the district.

CONCLUSIONS.

In compiling estimates in respect of probable revenue and expenditure, the committee (because it was anxious to stimulate an important industry) invariably sought to put the best case for the juicery. In most items costs were cut down to bedrock. Calculations in regard to revenue were based on Maffra operations in 1917-18, when the price of sugar was as high as £28 10s. per ton, a selling value that may not be maintained. As a set-off, in the same campaign the sugar content of the beet was lower than normal, being only 14.45 per cent.

The estimates when brought into juxtaposition show the following result:—

	£	s.	d.
Cost per ton crystalizable sugar in dried juice	20	7	11
Value at Maffra factory	19	15	6
Showing a loss per ton sugar of	0	11	5

(In the absence of precise knowledge as to the cost of evaporating the juice, the committee has decided that it is not in a position to recommend juiceries as an economic proposition. If Mr. Pearson's estimate as to cost of evaporation were confirmed, the net result would be a profit of about £2 a ton of sugar. Mr. Pearson asks that an experimental evaporator be tested this year at Maffra, for which he estimates the cost to be £250. The committee neither recommends nor opposes this proposal.)

Travelling Juicery.—Mr Pearson submitted estimates of costs of a travelling juicery which, he claimed, would be cheaper to operate than the stationary press juicery. There would be undoubtedly numbers of advantages were a plant taken from farm to farm as the crop was ready. On the other hand, the farmer would be required to provide water supply, shed, and pulp silo. Mr. Pearson stated that the cost of cartage to a stationary juicery would be saved to the farmer, but the farmer would take the risk of the beet being of low sugar content. As the Committee considered that only wealthy farmers could provide the necessary equipment, and as the fundamental difference in estimated cost of evaporation again applied, it was decided not to make any recommendation.

Mr. Williams is of opinion that any increased profits due to extended operations should not be invested in more costly methods of manufacture, but should be distributed between the growers of the beet and the consumer of the sugar, consistent with a just return to the industry itself.

ADDENDA.

While pursuing the inquiry, we have been greatly impressed by matters which did not come directly within the scope of your instructions, but which we desire to bring under your notice.

(1) The plant at Maffra factory was carefully inspected, and in certain critical departments was found to be comparatively obsolete and inefficient, so that operating costs are inflated. The plant was designed to treat 400 tons of beet a day, whereas portions of the machinery are capable of treating only 200 tons a day. This is, therefore, the maximum quantity that can be treated. Mr. Williams states that the factory cannot face a substantial increase of work unless the plant is remodelled, and that fact had to be considered in relation to Mr. Pearson's proposals. We have pointed out in our report that almost the whole of the revenue from the present output is absorbed by standing charges, and that if the output were doubled the factory would show a substantial profit. In the United States it is held that the minimum capacity of a sugar factory should be 500 tons per day. The cost of remodelling the Maffra factory would be in the region of from £20,000 to £30,000. Consideration of the figures in the main report indicates that if the output of the factory were doubled, after making allowance for increased costs of repairs, interest, depreciation, and management, the profit would be in the neighbourhood of £10,000 a year.

(2) In examining the figures showing past operations of the factory, we have been struck by the irregularity in the quantity of beet supplied, due to the unreliability of the Maffra rainfall. The supply improved when higher prices were offered by the factory. In order to secure an ample supply of roots, we consider that settlers on the Boisdale estate should be required to accept the scheme of irrigation which the Water Supply Commission have offered them. If this were done the increased profits of the factory would justify the payment of higher prices for roots, which, in their turn, would lead to increased production, with higher acreage yields—all of which would help to place the factory in a sounder financial position.

(3) It has been shown that an additional campaign, in doubling the sugar output of the factory, would bring in returns which, at the present selling price of sugar, would justify the payment of an extra £6 7s. 6d. per ton sugar in the juice at Maffra The same line of reasoning indicates that the factory, on a doubled output during its normal campaign, could pay freight on roots (at the greatly reduced Maffra beet rates) over considerable distances, and not only thereby increase its own profits, but encourage beet growing in districts which rainfall records show to be peculiarly suited to the crop, *e.g.*, Orbost and districts between Traralgon and Dandenong. Freight for 100 miles (at special beet rates) would amount to 5s. 3d. per ton roots, or, say, 45s. per ton crystallized sugar. If the factory agreed to pay 27s. 6d. per ton for roots delivered at a station within a radius of 100 miles, an enormous stimulus might be given the industry on a safe basis, or without rendering the State liable to more than year to year expenditures. All suitable districts along the lines of railway leading from Maffra could be thus tested, and, when results logically justified that policy, the Government could safely erect new factories in the proved centres. An extension of the radius of the special rate would afford an additional safeguard. The existing price of sugar cannot be expected to hold. If the supply of raw beet is increased by such railway rates, the output of the factory will be so augmented that it will be able to maintain existing prices for the raw product while the price of the manufactured article recedes.

(4) We also believe that the Government should give sympathetic consideration to the question of erecting mills beyond the 100-mile radius mentioned.

Throughout the inquiry every member of the committee has appreciated the tremendous importance of sugar beet production, because of its possible influence on the dairying and jam industries, and its application to such cardinal national problems as repatriation, closer settlement, and decentralization. Before any new mills are erected, however, we advise that the Department of Agriculture shall satisfy itself as to the adaptability of any given district for production, and that definite contracts be entered into with land-holders to plant, after erection, a given area each year for, say, ten years. This would give the guarantee of supply of beets that would justify the heavy cost of a mill. The plan in some cases adopted in the United States of having associated with the mill a

large area of ground upon which beets may be grown by the factory management is also worthy of consideration.

Minority Report.

It is only within the last few days that I have come to understand that the Committee was asked to pronounce definitely as to whether the type of juicerie now under consideration would or would not be profitable in the working. Had I understood this at the outset, I should probably have re-considered my willingness to work on the Committee, because I would have known that the whole question hinged mainly on the cost of evaporation, and as that cost could not be known without an actual trial, I should have understood that the Committee was asked to come to what was likely to be an impossible decision. All that the Committee could logically do would have been to decide whether it was worth while pursuing the investigation any further.

As showing how vague and indeterminate is the present knowledge as to the cost of the evaporation, it may be pointed out that while in the context of the Committee's report now submitted it is stated that the outcome of certain inquiries points to an evaporation of about 4 tons by 1 ton of coal, in the actual figures embodying the estimate of cost of working a juicery, the cost of fuel is not arrived at by calculating on this basis, but merely a round figure of £3 is assumed. Now, this figure of £3, when calculated out, gives an evaporation of, not 4 tons, but only 3.4 tons of water by 1 ton of coal. This incident is a clear indication of how vague and inadequate is the knowledge of the cost of the kind of evaporation we have had to consider. In fact, it is impossible to arrive at a definite decision without an actual trial of my evaporator; and as Messrs. Robison Brothers have quoted £115 as the present cost of an evaporator the same as that used in the Port Fairy experiment, I consider that an evaporator should be made and a test carried out.

Seeing that there is such uncertainty as to the cost of evaporation, it appears to me that the present report should give alternative estimates with both high and low costs of evaporation; it should also show the cost with wood fuel as well as with coal. Besides this, it ought to allow for the use of exhaust steam from the engine as an auxiliary in the evaporation. Also, that not less than four months of the manager-engineer's time should be devoted to actual repair work, and be charged to repairs. I consider, further, that estimates for all types of juiceries should be included in the report instead of only one; and also of different sizes of juiceries, instead of only a 5,000-ton one.

I have, therefore, prepared, and now submit, a statement which I prefer in place of all that part of the report from end of the paragraph beginning "(3) Travelling Press Juicery" to the end of the main report.

With all the rest of the report, and with the addenda, I concur.

(Signed) A. N. PEARSON.

For all that portion of the Committee's report from the end of the paragraph beginning "(3) Travelling Press Juicery" to the end of the main report, I prefer the following:—

Tentative estimates of the cost of working at these three types of juiceries have been prepared, and statements thereof are given below. The estimates, including cost of beet-root, labour, management, supplies, freight, receptacles for the dried juice, fuel, capital, interest, depreciation and repairs, and allowances for pulp and contingencies.

Beet-root.—It has been assumed that the same price would be paid at the juiceries as now paid at Maffra, namely, 27s. 6d. per ton. It has been assumed, also, that the roots would contain 15 per cent. of sugar as a normal. The Maffra beet has in some seasons averaged nearer 16 per cent. than 15 per cent. But, on the other hand, in the last campaign the average was only 14.45 per cent; this was said to be due to a difficulty in getting good seed, owing to the war. During his experiments in 1893, Mr. Pearson found that, while roots grown from ordinary seed averaged only 13,8 per cent. sugar, roots from selected seed—Vilmorin's Improved and Heine's Improved—grown alongside averaged 16.4 per cent. and 17.1 per cent. respectively. He points out that by importing a small amount of such improved seed annually, and growing it for seed production only, sufficient

high-grade seed could be grown locally every year for the State's requirements, and thus rich crops insured generally.

Labour.—The estimates of labour are based partly on work at the Maffra factory and partly on Mr. Pearson's experimental operations on press extraction. Wages at 10s. for an eight-hour day have been allowed.

Managing Engineer.—It would be necessary to engage the manager for the whole year. During the non-manufacturing period he would have to supervize and also himself undertake repairs; he could also, in part of his time, undertake propaganda and educational work in his district. His work on repairs would be charged to repairs.

Freight.—The freight on dried juice has been reckoned at the special rate for beet-root in the Maffra district. The dried juice being a raw product, and the encouragement of the beet industry being the object in both cases, it has been assumed that the same railway rate would apply, viz., 1s. per ton flat rate, plus ¼d. per mile. The freight has been calculated at this rate for 100 miles, taken as the average distance from Maffra to districts where juiceries might be established. A suggestion that the farmers should pay half the freight has not been adopted in the estimates.

Receptacles.—It has been assumed that the dried juice would be put into bags, similar to cornsacks, but of somewhat closer texture. These would be used three times, and, including freights, would cost 10s. per dozen.

Fuel for Evaporation and Power.—As regards fuel for evaporation, the Committee found it impossible to come to agreement. Mr. Pearson did not, at the time of his experiments of 1894-5, determine the amount of fuel used in evaporation; but he states that at Port Fairy a 6-h.p. travelling engine was used for generating steam in evaporation. This, with ordinary stoking, produced enough steam in nine hours to evaporate 9 or 9½ tons of beet juice down to a dryness of 7 per cent. of moisture, and, in addition, to operate one of the machines: and as this engine with such stoking could not have burnt more than 2 tons of wood in the time, he infers that 1 ton of wood must have evaporated not less than 3½ tons of water from the juice, and—taking 1 ton of coal as equal to 2 tons of wood—an evaporation of 7 tons by 1 ton of coal. With perfect efficiency, 1 ton of coal should evaporate 9 tons of water. Mr. Pearson, therefore, claims for his evaporator an efficiency of about 75 per cent.

On the other hand, other members of the Committee made extensive inquiries regarding this question, but found it difficult to obtain reliable data regarding the type of evaporator proposed by Mr. Pearson. The outcome of these inquiries points to an evaporation of about 4 tons of water from the juice by 1 ton of coal burnt. This would give an efficiency of about 45 per cent. The discrepancy between these two estimates is of vital importance to the whole question. The matter can be brought to a decision only by an actual trial; and Mr. Pearson suggests that a trial should be made with an evaporator, constructed to his design, to be used during the coming Maffra campaign. He considers that it is in a high degree probable that the result of such a trial would confirm this estimate. The cost of an evaporator the same size as that used at Port Fairy, with some addition, would be about £170, and the expense about £60, making a total cost of £230, or, say, £250.

As the Committee has been unable to reach unanimity on this point, two sets of figures are given in the following estimates, one for an efficiency of 75 per cent. and another for an efficiency of only 40 per cent., or 3.6 tons evaporated by 1 ton of coal.

It is obvious that exhaust steam from the engine can be used as an auxiliary for evaporating, and 80 per cent. of the exhaust steam has been allowed. The fuel for driving has been based on the estimate of that used at Maffra up to the infusion stage.

In nearly all the districts in Gippsland where juiceries might be established wood fuel would be abundant. The cost of firewood in country districts varies widely, from 7s. to 14s. per ton by weight: 11s. has been taken for the estimates.

In districts where wood is not available coal would have to be used: this has been taken at 30s. per ton. In the following estimates separate figures are given for the use of wood fuel and for coal fuel.

The items of capital, depreciation, repairs, pulp, and contingencies will be commented on separately under the headings of the three types of juiceries.

Infusion Juiceries.—The following are the estimates of costs at a 5,000-ton infusion juicery:—

INFUSION JUICERY.

5,000-ton capacity; working three shifts for 100 days; 15 per cent. richness of roots.

Beet, 8 tons at 27s. 6d.	£11 0 0
Weighing	0 1 7
Labour	1 10 5
Managing Engineer, at 18s. 7d. per day during campaign	0 3 0
after the campaign, 6s., less 3s. charged to repairs	0 3 0
Freight, 7s. 5d.; bags, 5s. 4d.	0 12 9
Supplies	0 2 2
Interest, depreciation, and repairs	2 8 2

Fuel—	75% Efficiency. Wood.	75% Efficiency. Coal.	40% Efficiency. Wood.	40% Efficiency. Coal.
	£1 4 5	£1 13 5	£2 6 4	£3 3 3
Totals	17 5 6	17 14 6	18 7 5	19 4 4
Less 4.4 tons pulp at 2s. ..	0 8 10	0 8 10	0 8 10	0 8 10
Contingencies, 5%	16 16 8	17 5 8	17 18 7	18 15 6
	0 16 10	0 17 3	0 17 11	0 18 9
Total costs ..	£17 13 6	£18 2 11	£18 16 6	£19 14 3

Capital.—In the absence of proper drawings for an infusion juicery, it has been impossible to arrive at a definite estimate of the cost of plant and building, but a tentative estimate has been made, showing a total of £16,475 for cost of plant, building, and working capital.

Interest.—Interest on working capital is charged for two-thirds of the year on the assumption that this will be returned during the year as payment for dried juice, the Maffra factory similarly recouping itself by sales of finished sugar.

Depreciation and Repairs.—Depreciation has been taken at 4 per cent. of capital cost, and repairs at 5 per cent.

Managing Engineer.—The manager, in addition to being a working engineer, would have to secure a knowledge of the chemical tests required for the control of the infusion process. His salary would be £281 10s. a year.

Pulp.—It is assumed that the pulp would shrink to one-half its original weight by drainage, &c., and would be then sold at 2s. per ton, the price now charged at Maffra for this by-product.

Contingencies have been reckoned at 5 per cent.

The total costs in the above figures may now be placed in juxtaposition with the value at Maffra of the crystallizable sugar contained in the dried juice, thus:—

	Cost at Juicery.	Value at Maffra.	Possible Profit.
75% efficiency—			
Wood fuel	£17 13 6	£19 15 6	£2 2 0
Coal fuel	18 2 11		1 12 7
40% efficiency—			
Wood fuel	18 16 6		0 19 0
Coal fuel	19 14 3		0 1 3

Press Juiceries.—Owing to the large amount of capital for infusion juiceries, attention has been given to the possibilities of the old system of hydraulic presses for juicery purposes. Although in large factories the infusion plant costs less than the press plant, in small factories the press plant costs less than the infusion. The extraction from presses, it is true, is less complete than from infusers, and the cost of labour is greater; nevertheless, the saving in capital and in fuel, and the higher value of the by-product, pulp, in the press system, may more than

counterbalance the disadvantages. Estimates of cost of working a 5,000-ton press juicery have, therefore, been prepared, as follows:—

PRESS JUICERY (STATIONARY).

5,000-ton capacity; working three shifts a day for 104 days, 48 tons daily; 84% extraction.

Beet, 8.66 tons, at 27s. 6d.	£11 18 0
Labour (including weighing)	2 4 9
Managing Engineer, 16s. 8d. a day during the campaign	0 3 0
after the campaign, 5s. 9d., less 2s. 11d. charged to repairs	0 3 10
Freights, 7s. 5d.; bags, 5s. 4d.	0 12 9
Supplies	0 5 0
Interest, depreciation, and repairs	1 2 7

	75% Efficiency.		40% Efficiency.	
Fuel—	Wood.	Coal.	Wood	Coal.
	£0 19 6	£1 6 8	£1 16 10	£2 10 4
Totals	17 8 5	17 15 7	18 5 9	18 19 3
Less 1,386 tons pulp at 10s. ..	0 13 10	0 13 10	0 13 10	0 13 10
	16 14 7	17 1 9	17 11 11	18 5 5
Contingencies, 7½%	1 5 1	1 5 8	1 6 4	1 7 5
Total costs ..	£17 19 8	£18 7 5	£18 18 3	£19 12 10

Capital.—The estimate of capital is based mainly on a quotation for the machinery at post-war rates from Messrs. Robison Brothers, who made the experimental plant 24 years ago, and still have the drawings. The cost of plant and building, together with working capital, is estimated at £7,964.

Repairs are charged at 5½ per cent. instead of 5 per cent. as in the previous case.

Managing Engineer.—The manager would not require a knowledge of any chemical tests, and would, therefore, receive a somewhat smaller salary; £250 a year has been allowed.

Water.—Water has not been charged for. The press juicery would require much less water than the infusion juicery. It has been assumed that the juicery would be erected close to a sufficient water supply. Water is generally plentiful about the winter season, when alone juiceries would operate.

Fuel.—As press juice would be less than infusion juice less evaporation would be required; therefore, less fuel would be used, also a little less fuel would be needed for power.

Pulp.—This pulp, which is more like press-cake than watery pulp, contains from 40 to 42 per cent. solid matter, and Mr. Pearson gives it a fuel value of not less than 28s. 6d. per ton. Infusion pulp, when drained down to half its original weight, would contain only 9 per cent. solids. The Maffra pulp, which in parts shrinks in time to much less than half original weight, and may contain from 8 to 20 per cent. solids, is sold at 2s. per ton. It is admitted that its food value should command a higher price, but dairy farmers require educating regarding its value, and, in the meantime, it would be unwise to assume a price that could not be obtained for some years. The Committee considers that 10s. is the maximum price that could generally be secured at present.

Contingencies.—As the uncertainties of the press juicery would be greater than with infusion, 7½ per cent. is allowed for contingents, instead of 5 per cent. as in the previous case.

The total costs of the press juicery as above shown may now be placed in juxtaposition with the value at Maffra, thus:—

	Cost at Juicery.	Value at Maffra.	Possible Profit.
75% efficiency—			
Wood fuel	£17 19 8	£19 15 6	£1 15 10
Coal fuel	18 7 5		1 8 1
40% efficiency—			
Wood fuel	18 18 3		0 17 3
Coal fuel	19 12 10		0 2 8

The possible profits thus shown are somewhat less than with the infusion juicery, but this diminution is solely due to the higher percentage allowed for contingencies for the press juicery.

Travelling Press Juiceries.—That beet juice can be expressed and evaporated on a practical scale and without difficulty on the farm was shown by Mr. Pearson's experiments 24 years ago.

If the plant then used had been somewhat enlarged and made portable, it could have been used as a travelling juicery, and moved from farm to farm. The advantages of such a proposition would be numerous; thus:—

1. There would be no carting of the roots from the farm to the juicery, so that there would be an average saving of, say, 2s. 6d. per ton on the cost of the roots.

2. There would be no carting of the pulp from the juicery to the farm, thus an average of, say, 2s. 6d. would be added to the value of the pulp.

3. No special building would be required; the work could be done in a farmer's shed; a mere roof without walls would serve. If none were available, the farmer could build one at a cost of £30, which would be required for juicery purposes for only a few days in the year, and would be of permanent use to the farmer.

4. No weighing would be needed, therefore no weighbridge.

5. The farmer would tip the roots right on to the washer platform, therefore no flume would be needed.

6. The pulp would be removed at once by the farmer, therefore no pulp bin and no conveyer would be required.

7. The farmer would supply the fuel which, on a farm, would be wood; in many cases he would obtain it off his own land, and at the lowest cost.

8. The farmer would supply his own bags and the lime.

9. There would no clerical work and no accounts, except of the simplest.

10. It could operate on a guarantee of only 1,600 tons instead of 5,000.

11. The farmer would receive higher net returns than from a stationary juicery.

It follows from all the above that the capital required for a travelling juicery would be much less: in fact, only about one-third of that required for a stationary juicery.

There would, however, be a new cost, namely, that of transporting the plant from place to place. But the least consideration demonstrates that this cost would be much less than that of carting the roots and the pulp. The transport of the machinery presents no practical difficulty. The press juicery plant is in few parts and comparatively small, and it would be an easy task to put it on wheels. The evaporator would be put on its own wheels and kept on them. The two presses would be hung in a carriage of their own, and kept in it. The rasper, washer, tank, &c., would be placed in a specially-built trolly for transport, and taken out for action. The trolly and the presses would be dragged by the engine, and the evaporator by four horses. It would not require more than one day's work at the outside for each removal. The cost would, therefore, be a day's wages for the men, plus the cost of fuel and the hire of four horses. The cost, therefore, would be—

Wages	£4 4 8
Fuel	0 5 0
Horses	0 10 0
	£4 19 8

or £5 for each trip. An average of ten trips may be assumed for each campaign.

The farmer would have to provide storage for his press-cake or pulp. An average of 26 tons would have to be reckoned with 84 per cent. extraction. A silo of 30 cubic yards' capacity would suffice. The dimensions for an overground silo would be 10 feet diameter by 12 feet high. It would cost probably about £20. A pit silo might cost less. It would be a permanent improvement.

The cost of working a travelling juicery is estimated as follows:—

TRAVELLING PRESS JUICERY.

Working one shift of 8 hours; capacity, 2 tons an hour; 84 per cent. extraction.

Beet, 8.66 tons at 25s.	£10 16 6
Labour, six men at 10s. and one at 8s. ..	3 16 10
Engineer in charge, at 16s. 8d.	0 9 0
Freight and bags	0 12 9
Supplies	0 5 9
Travelling of plant	0 5 2
Interest, depreciation, and repairs ..	1 14 7

	75% Efficiency.	40% Efficiency.
Fuel (wood only)	£0 19 6	£1 16 10
Totals	17 0 1	17 17 5
Less 1.386 tons pulp at 12s. 6d. ..	0 17 4	0 17 4
	16 2 4	17 0 1
Contingencies, 10 per cent. ..	1 12 3	1 14 0
	£17 15 0	£18 14 1

Capital is estimated at £3,400. Depreciation is taken at 5 per cent. instead of 4 per cent., and repairs at 6 per cent. instead of 5½ per cent. in the previous case. In the travelling juicery the farmer would pay a fixed price per ton of dried juice for the extraction and evaporation, and would receive payment direct from the central factory for his product. In this case he would take the chances of higher or lower richness of his roots, but in the adjustment of prices payable by the central factory he would get a higher net return than from the stationary juiceries; with roots of 15 per cent. he would net about 29s., or even over 30s., per ton instead of only 27s. 6d.

The total costs may now be placed alongside the Maffra values:—

	Costs at Juicery.	Value at Maffra.	Possible Profit.
75% efficiency ..	£17 15 0	£19 15 6	£2 0 6
40% efficiency ..	18 14 1		1 1 5

In all the above estimates but little latitude has been allowed beyond the percentages for contingencies.

General Conclusions.—A general view of the above statements of possible profits is now given, thus:—

	With 75% Efficiency.	With 40% Efficiency.
Infusion juicery—Wood fuel ..	£2 2 2	£0 19 0
Coal fuel	1 12 7	0 1 3
Press juicery—Wood fuel	1 15 10	0 17 3
Coal fuel	1 8 1	0 2 3
Travelling juicery—Wood only ..	2 0 6	1 1 5

Thus, it will be seen that the possible profits from the operations according to these estimates would vary in the case of a 75 per cent. efficiency of the evaporator from a minimum of £1 8s. 1d. to a maximum of £2 2s. 2d. per ton of sugar, and in the case of only 40 per cent. efficiency from a minimum of 1s. 3d. to a maximum of £1 1s. 5d. The general average of these estimates is £1 4s.

Division of Profits.—The possible profits would have to be divided between the central factory and the juicery in the case of the stationary juicery, and amongst the factory the juicery and the farmer in the case of the travelling juicery. If

half the profits went to the factory, then the factory would receive—accordi to the above figures—12s. per ton profit on the finished sugar, and the juicery, the one case, would receive 12s.; or, with the travelling juicery, the juicery wou receive 6s. and the farmer 6s.

If, under these conditions, the Maffra factory worked another campaign 70 days, and produced another 1,650 tons of sugar, it would earn an addition profit of close on to £1,000. If it worked three additional such campaigns, mak ing a total year's work of 280 days, it would earn an additional profit of £3,00 through the operations of the juiceries.

Final Decision of the Committee.—In the absence of precise knowledge as t the cost of evaporating the juice, the Committee is not in a position to recom mend these juiceries in all cases as an economic possibility. If Mr. Pearson's estimate as to fuel required were confirmed, the proposition would be profitable Mr. Pearson asks that an evaporator be made and tested this year at Maffra, and states that the cost of the trial need not cost more than £250.

Effect of Size of Juicery on Cost of Working.—In the previous estimate for stationary juiceries a capacity of 5,000 tons of roots has been assumed. But further estimates have been made for larger juiceries, and, without entering here into details, it may be stated that these estimates show that the cost of working a 6,000-ton juicery would be approximately 13s. less than at a 5,000-ton juicery In this case the operations would appear to be profitable even allowing the lower rate of efficiency.

Larger than the 6,000-ton juiceries would be inapplicable in Australia at present, but in America 40,000-ton juiceries (with pipe delivery of the juice to the central factory) have been used. Estimates have, therefore, been made for larger juiceries, and these indicate that with a 15,000-ton juicery the costs per ton of sugar would be about 35s. less than with a 5,000-ton one, and with a 40,000-ton juicery 66s. less.

Effect of Fall of Market Price of Sugar.—The foregoing estimates have hitherto been made under present market conditions for sugar. With lower prices losses might ensue. These losses could be met in two ways. At the Maffra factory the installation of the plant (Steffen's process) for dealing with molasses would more than cover any likely losses. And as regards field operations, a general increase of 1 per cent. in the sugar contents of the roots would cause an increase of the profits from £2 to £3 10s. per ton of sugar, varying according to the extent of the operations. There should be no difficulty in securing, by means of improved seed, an average of 16, or even 16½, per cent. throughout the beet districts.

Wide Significance of the Committee's Inquiries.—The inquiries of the Committee have had a wider significance than just the fortunes of the Maffra factory. The report now submitted should be of use to any beet factories to be erected in future in Australia, and, without doubt, may be read with interest in other countries. Also, it may be usefully considered by the cane-sugar industry, in which the fuel to be used for evaporation would be bigasse, a by-product, and of merely nominal cost.

Principle of Continuous Work at Sugar Factories.—It has been pointed out that the principle of working a sugar factory throughout the year was early recognised in Europe, and was put into practice with apparently great advantage more than 60 years ago. This was effected by drying the sliced beetroots and storing them indefinitely for later extraction. Subsequent vigorous developments in another direction have pushed this principle out of view in more recent years, but may, perhaps, be brought into consideration again, both in the beet and the cane industry. For it is evident that if the juice could be profitably evaporated at a juicery, much more profitably could it be done at a large factory. At the Maffra, for instance, using the above estimated figures, the cost would be thus:—

	75% Efficiency.	40% Efficiency.
Costs at Maffra up to infusion stage ..	£13 8 0	£13 8 0
Fuel (coal only) for evaporation ..	1 4 10	2 14 8
Labour, bags, and interest	0 8 0	0 8 0
Total cost	15 0 10	16 10 8
Value of dried juice	19 15 6	19 15 6
Profit	£4 14 8	£3 4 10

Thus, if this principle were adopted in new factories to be erected, the plant required beyond the infusion stage need be only one-third the capacity otherwise required, and an important saving of capital effected, while at the same time a large part of the working staff could be given continuous employment instead of for only a short part of the year.

(Signed) A. N. PEARSON.

FOOT ROT IN SHEEP.

W. M. Lerew, Veterinary Officer.

While foot rot is frequently found in sheep, cattle also sometimes suffer from it. It is prevalent in low-lying country, where the dampness causes a softening of the horn tissue, and a favorable field for the growth of the specific cause, evidently some organism that exists in badly drained land, dirty yards, &c. The trouble may be spread by immediate contact. It is confined to the foot, but the swelling may extend a little above the coronet. The primary lesion is an inflammation of the coronary-band, extending to the sensitive laminæ and becoming septic.

The first symptom to be noticed is slight lameness, which gradually becomes worse till the animal is unable to walk owing to the pain in the affected part. Examination shows great tenderness, the coronet is swollen, and a foul discharge exudes between the claws. The discharge induces further destruction of tissue, the claws gradually separating from the foot till they fall off. The animal will lose flesh, and soon die, unless attended to. If proper treatment, however, is adopted, recovery will generally follow.

The first step, if treatment is to be successful, is to isolate the diseased animal in a clean, dry, well-drained paddock. Carefully examine each foot, and, with a sharp knife, remove all loose horn, and trim up the foot. In the early stages, a foot bath, containing a 5 per cent. solution of copper sulphate, or a 5 per cent. solution of formalin, will speedily check the disease. Another bath may be made up of—arsenic, 2 ozs., and washing soda, 4 ozs., boiled in one gallon of water till the arsenic is dissolved. This solution should be used when cool, and, in view of its poisonous nature, sheep must not be put through a bath of it when thirsty.

In the later stages of the disease treatment will have to be continued for a considerable period. The sheep should then be put through the foot bath three times a week. If large numbers are to be treated, an ordinary dipping race could be used, or a shallow wooden trough may be made, the solution being put in to a depth of about 3 inches. Allow each animal to stand in the bath for one minute, and avoid splashing, if possible; then place in a dripping pen till the feet are dry. If only a few sheep are affected, they may be treated individually, the diseased part being dressed with an ointment consisting of 5 per cent. carbolic acid, or 5 per cent. iodine, in vaseline. The foot should then be bandaged. Methylated tincture of iodine painted on will also prove very beneficial, but is rather expensive, unless for use in the case of stud sheep.

STANDARD TEST COWS.

Report for Quarter ending 31st March, 1919.

Total number of cows completed, 79; total number of cows certificated, 73.

The following are the individual records:—

W. K. ATKINSON, Swan Hill. (Shorthorn.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Morven Queenie IX. ..	Not yet allotted	17.5.18	273	20½	6,739	4·15	279·83	175	319

Mrs. A. J. BLACK, Noorat. (Jersey.)

Completed since last report, 3. Certificated, 3

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Flashlight	1972	5.4.18	273	4½	5,903	4·53	267·69	250	305½
Mona's Pearl	3577	6.4.18	273	10	5,612	4·75	266·59	250	304
Madge	3575	10.4.18	273	9½	5,513	5·08	280·14	250	319½

DEPARTMENT OF AGRICULTURE, Wyuna. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Rosella II. of King's Vale..	3888	9.5.18	273	22	7,219	5·69	411·00	250	469½

DEPARTMENT OF AGRICULTURE. (Red Poll.)

Completed since last report, 7. Certificated, 6.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Azora	Not yet allotted	28.4.18	273	14½	7,118	4·25	302·90	200	345
Cutty	..	16.5.18	273	19½	9,068	4·69	453·73	250	517½
Muria	..	17.5.18	247	4	7,066	5·42	383·04	250	436
Carribia	..	18.5.18	273	4	6,750	4·55	307·36	250	350½
Goldlace	..	18.5.18	273	19	7,912	4·72	373·15	250	425½
Congo	..	5.6.18	273	18½	7,781	4·12	320·93	250	366

C. FALKENBERG, Elliminyt. (Jersey.)

Completed since last report, 3. Certificated, 2.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Silver Belle of Colac ..	4030	28-4-18	273	11	3,951	5-60	221·26	200	252¼
Annie of Taringa ..	4023	17-5-18	273	12	6,265	5-61	351·48	250	400¾

GEELONG HARBOR TRUST, Marshaltown. (Ayrshire.)

Completed since last report, 2. Certificated, 2.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Gipsy Girl of Sparrovale ..	3894	30-3-18	273	17	6,275	5-16	323·73	175	368¼
Madge of Sparrovale ..	3899	16-1-18	273	12½	6,684	4-46	298·47	250	340¼

T. HARVEY, Boisdale. (Jersey.)

Completed since last report, 2. Certificated, 2.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Lady Marge of Jerseyholm	4981	11-5-18	273	15½	6,496	6-43	417·80	200	476¼
Kirsty VI. of Jerseyholm	4980	18-5-18	273	12½	5,378	6-46	347·45	175	396

S. CULLIS HILL, Lower Plenty, Heidelberg. (Jersey.)

Completed since last report, 2. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Cloverleaf	Not yet allotted	8-5-18	273	13	5,785	4-79	276·79	200	315½

A. JACKSON, Glen Forbes. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of
				lbs.	lbs.		lbs.	lbs.	lb
Creamy of Lesterfield ..	Not yet allotted	8.4.18	273	17	5,679	5·08	288·23	175	30

A. W. JONES, "Whittington," Geelong. (Friesian and Jersey.)

Completed since last report, 3. Certificated, 3.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
Friesian—				lbs.	lbs.		lbs.	lbs.	lbs.
Bolobek Bess ..	Not yet allotted	29.3.18	273	21	9,551	4·25	405·85	200	262½
Jersey—									
Lady Grey 1st of St. Albans	4186	18.4.18	273	22½	7,032	6·62	465·56	250	530½
Fuchsia XIII. of Melrose	Not yet allotted	26.5.18	273	23½	6,257	5·68	355·17	175	405

C. G. KNIGHT, Cobram. (Jersey.)

Completed since last report, 10. Certificated, 10.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Veronica of Tarnpirr ..	5174	28.3.18	273	22½	6,679	6·08	406·63	175	463½
Rosebud of Tarnpirr ..	4210	31.3.18	273	15½	5,879	6·41	376·75	250	429½
Ringtail of Tarnpirr ..	5170	2.4.18	273	18	6,019	6·32	380·31	175	433½
My Queen of Tarnpirr ..	4209	3.4.18	263	4	6,456	6·17	398·52	250	454½
Lady Choice of Tarnpirr ..	5160	2.4.18	273	30½	8,007	6·17	493·80	175	563
Princess May of Tarnpirr	5168	6.4.18	273	21	7,589	4·98	377·70	200	430½
Mistletoe of Tarnpirr ..	2984	12.4.18	273	20½	9,060	5·02	455·13	250	518½
Marie	Not yet allotted	24.4.18	273	10	4,478	6·30	282·28	175	321½
Peep-Bo of Tarnpirr ..	5166	29.4.18	273	26	8,705	5·15	448·71	200	511½
Nimmitabel	Not yet allotted	22.5.18	273	16½	5,757	5·40	311·03	175	354½

T. MESLEY, Dalyston. (Jersey.)

Completed since last report, 2. Certificated, 2.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Philomel	5255	27.4.18	273	27	9,001	4.96	446.74	250	502½
Daisy of Springhurst ..	1788	7.6.18	273	18½	9,139	5·67	518·12	250	590½
Brighton Peeress	Not yet allotted	23.6.18	273	10	5,360	5·01	268·60	175	306½

C. G. LYON, Heidelberg. (Jersey.)

Completed since last report, 11. Certificated, 11

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Starfinch II.	2915	30.3.18	273	21	7,227	4·90	360·91	250	411½
Hawthorn IV. of Banyule	5207	2.4.18	273	17½	6,726	5·62	378·18	200	431
Soprano	1395	13.5.18	273	43	5,751	5·86	336·83	250	384
Ettie IV.	2889	16.6.18	273	12½	9,756	4·28	417·24	250	475½
Hawthorn V. of Banyule..	5208	9.5.18	273	19	7,007	5·25	367·66	200	419
Noble's Pet	4217	17.5.18	273	20	7,747	4·90	378·79	200	442
Chorus	2823	13.6.18	273	20½	7,446	5·75	427·50	250	487½
Tambourine	1417	14.6.18	273	20	6,826	4·85	331·18	250	377½
Hawthorn VI. of Banyule	5209	23.6.18	273	11½	4,512	5·27	237·78	175	271
Cora	3331	24.6.18	273	14	6,389	5·87	375·36	250	427
Milkmaid 37th	1222	24.6.18	273	21	8,369	5·05	421·05	250	487

W. PARBURY, Warburton. (Jersey.)

Completed since last report, 1. Certificated, *nil*.

R. RALSTON, "Moglonemby," Euroa. (Ayrshire.)

Completed since last report, 3. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Lucy of Ben Kell	2301	20.6.18	273	5½	5,948	4·61	274·09	250	312½

J. D. READ, Springhurst. (Jersey.)

Completed since last report, 16. Certificated, 16.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Buttercup of Springhurst..	3702	4.4.18	273	11	5,963	5·94	354·18	250	404
Mimulus of Springhurst ..	5400	8.4.18	273	10	1,091	6·21	252·88	175	289½
Verbena of Springhurst ..	5407	18.4.18	273	6	6,559	5·73	375·84	200	428½
Cobea of Springhurst ..	4379	30.4.18	273	13½	6,791	5·31	360·29	250	411
Tulip of Springhurst ..	2730	3.5.18	273	10	5,531	5·39	297·88	250	339½
Infanta of Springhurst ..	5396	4.5.18	273	7½	6,185	5·66	349·87	200	399
Holly of Springhurst ..	5395	4.5.18	273	12½	8,420	5·82	373·80	200	426½
Trefoil of Springhurst ..	4385	5.5.18	273	10	7,652	6·16	434·43	250	495½
Balsam of Springhurst ..	4376	7.5.18	273	4	7,072	5·07	344·72	250	393
Lobelia of Springhurst ..	4386	6.5.18	250	4	6,000	5·30	318·01	250	362½
Crocus of Springhurst ..	5393	11.5.18	273	12	7,027	5·59	392·82	200	448
Solanum of Springhurst ..	4394	26.5.18	243	4	6,913	4·55	315·66	250	360
Freezia of Springhurst ..	4382	29.5.18	273	13½	7,429	5·91	439·31	250	500½
Czarina of Springhurst ..	4380	30.5.18	255	4	5,961	5·37	320·49	250	365½
Princess of Springhurst ..	2521	4.6.18	262	4	6,621	5·57	368·66	250	420½
Fleur-de-lis of Springhurst	5394	16.6.18	273	14½	6,878	4·06	320·73	175	365½

A. H. S. SCHIER, Caldermeade. (Ayrshire.)

Completed since last report, 2. Certificated, 2.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Boronia II. of Pine Grove	4626	20.4.18	273	11	5,828	4·61	268·63	175	306¼
Primrose II. of Pine Grove	4640	22.4.18	273	13	6,005	4·10	246·32	175	280

O. J. SYME, Macedon. (Friesian.)

Completed since last report, 3. Certificated, 3

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Pearl of Friesland Park ..	Not yet allotted	1·4·18	273	21½	8,336	3·54	295·47	250	337
Jeannie de Kol Posch Lee	,,	1·5·18	273	22	9,428	3·69	348·02	250	396¾
Bolobek Dolly Gray ..	,,	23·6·18	273	22	11,367	3·69	419·42	200	478

C. H. WINDSOR, Pakenham. (Jersey.)

Completed since last report, 2. Certificated, 2

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Vanilla VIII. of Melrose ..	5565	20.3.18	273	17	6,427	5·98	384·48	200	438¾
Pearl IV. of Melrose ..	5556	26.5.18	273	17	6,681	6·06	404·81	200	461¼

W. WOODMASON, Malvern. (Jersey.)

Completed since last report, 4. Certificated, 4.

Name of Cow.	Herd Book No.	Date of Calving.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Weight of Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Rarity VI. of Melrose ..	3675	1·3·18	273	19	6,727	5·44	365·91	250	417
Jenny Lind X. of Melrose..	Not yet allotted	14·4·18	273	21½	7,445	5·74	427·10	200	487
Graceful Duchess XIV. of Melrose	5540	30.5.18	273	17½	6,632	6·50	431·02	200	491¼
Empire VI. of Melrose ..	5534	20.6.18	273	18	7,639	6·28	479·89	250	547

A CONTRIBUTION TO THE STUDY OF HEREDITARY UNSOUNDNESS IN HORSES.

By W. A. N. Robertson, B.V.Sc., Chief Veterinary Officer.

(Continued from page 310.)

FAMILY 11.

This is a short family with only 62 representatives, and 16, or 25.8 per cent., of them are unsound. The analysis of the family is as follows:—

TABLE SHOWING PERCENTAGE UNSOUNDNESS IN FAMILY 11.

Sires.	Sons.			G Sons.			GG Sons.			GGG Sons.			GGGG Sons.			Totals.		
	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.
11.1	..	..	..	..	..	..	16	1	6·2	14	2	14·3	2	..	..	32	3	9·37
11.2	..	..	..	..	..	..	4	..	..	21	12	57·1	3	1	33·3	28	13	46·4
11.3	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	2	..	..
Totals	..	..	..	1	..	..	20	1	5·0	36	14	38·8	5	1	20	62	16	25·8

It will be seen, by considering the full table, that the branch through 11.1 is a sound one. 11.111 has 15 sound sons and 12 sound and 2 unsound grandsons. Only one of the latter, viz., 11.11111 can be traced; his dam was by 2.526. If unsoundness was dominant in the blood of 11,111, there would not be so many mature horses sound at examination. The unsoundness present in 11.1121 was possibly inherited from his dam; she was by 9.51, and the granddam carried the blood of 1 in her veins. Through 11.2 the reverse picture is presented. 11.2111 was sound as a 7-year-old, yet of 21 sons examined 12, or 57 per cent., were defective, many of them as 3-year-olds. At first sight it would appear that 11.2111 must be responsible for the unsoundness, but the furthest analysis that can be made of pedigrees of the dams of his sons shows as follows. First, as regards the sound sons:—

The dam of 11.21118 was apparently by a grandson of 4.4, a sound line.

The dam of 11.211105 was by a son of 17.1, a sound family.

The dam of 11.211106 was by a grandson of 2, a sound family.

Of the unsound sons, the following history can be traced:—

The dam of 11.21114 was by 22.2, an unsound line.

The dam of 11.21115 was by 2.217, whose sire was unsound.

The dam 11.21116 was by 7.47; he was not examined; one son was, and found unsound.*

The dam of 11.21117 was by 2.219, an unsound horse.

* 7·471 appears in the tables as sound; this is an error; he had sidebones.

The dam of 11.21119 was by 2.217, whose sire was unsound.

The dam of 11.211101 was probably by a son of 1, of unsound family.

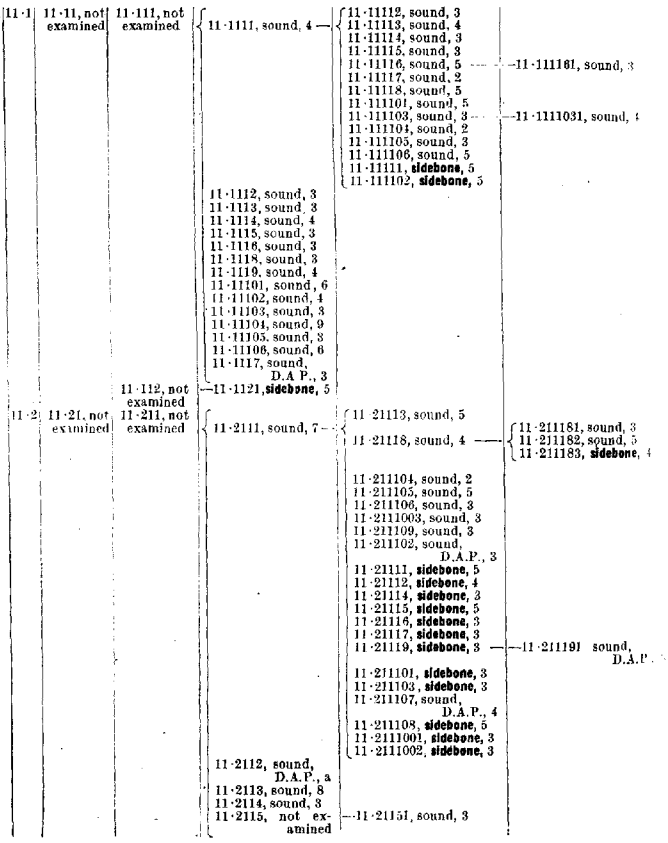
The dam of 11.211103 was by 2.2102, an unsound horse.

The dam of 11.2111002 was probably by a son of 38, of an unsound line.

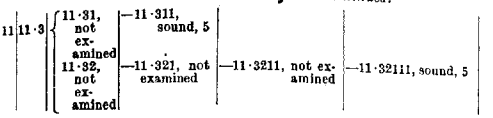
It is thus apparent that when mated with soundness the progeny was sound, and when with unsoundness then unsoundness developed, and seeing that 11.2111 was sound at 7 years, the inference is that the line up to this horse is sound, or, at most, the unsound factor is very small.

The full table of this family is as follows:—

FAMILY 11.



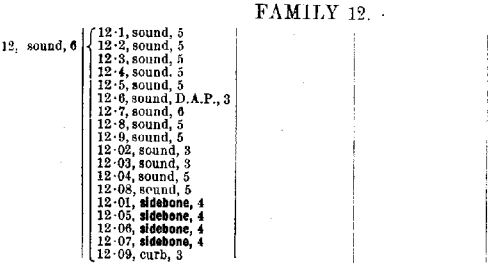
Family 11—*continued.*



The remaining families dealt with have very few representatives, and little comment is necessary in regard to them. Some of the members have been referred to from time to time as being present in dams' pedigrees.

It will be noted that the family numbers do not run in sequence. This is due to the fact that some of the families were found to be branches of others, and have been incorporated with them (family 10 may be taken as an example; this was found to be a branch of 2), while many of them have only five or six representatives, from which no data of value can be obtained, and have consequently been omitted. In all 76 families have been tabulated.

FAMILY 12.



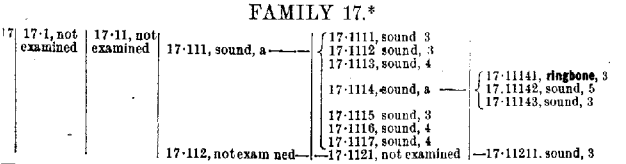
This is a short family of 19 members, the sire, sound at 6 years and 18 sons, 4 of them, or 22.2 per cent., were unsound. The unsoundness appears to have been introduced through the dams, for—

The dam of 12.01 was probably by a son of 1.
The dam of 12.05 was probably by a son of 1.
The dam of 12.06 was by 17.22, a sire of unsoundness.
The dam of 12.07 was by 3.1022, of unsound line.
12 was known to be sound long after the date of his examination.

FAMILY 16.

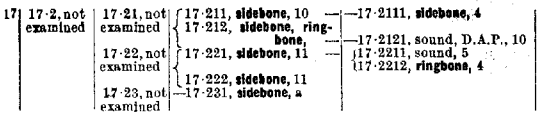
Was published in the first instalment of this article, May, 1918.

FAMILY 17.*



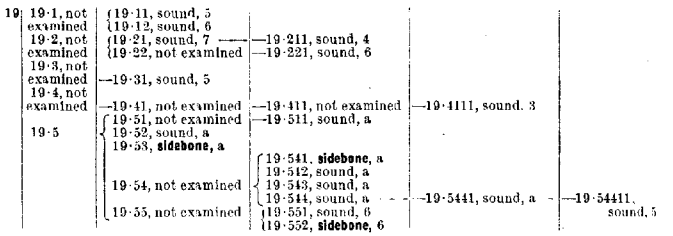
* Since this table was prepared evidence has been obtained which connect this family with family 9·17 being a son of 9·52, viz. 9·523. As the relationship is distant, consideration of Family 17 as a separate family does not affect the general result.

Family 17—*continued.*



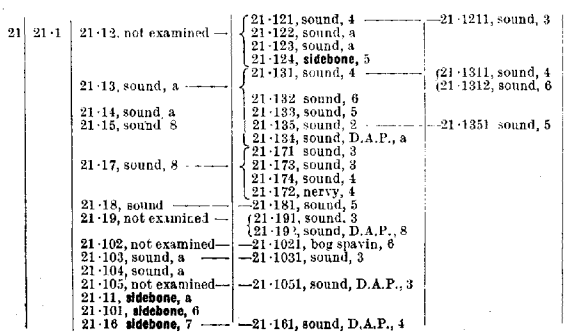
This family divides into two branches—that through 17.1 being apparently sound, and that through 17.2 very unsound. The former, with twelve representatives, has one unsound, or 8.3 per cent.; of the nine representatives of the latter, seven, or 77.7 per cent., are unsound. There would appear, therefore, to be little doubt that 17.2 was an unsound horse.

FAMILY 19.



From the number of aged horses of this family found sound on examination, it may be regarded as sound. The pedigrees of the unsound members cannot be traced to representatives in these tables. Many mares by 19.5 have been seen, and they are always regarded as of a sound line. Eighteen members have been examined, and three, or 16 per cent., show unsoundness.

FAMILY 21.



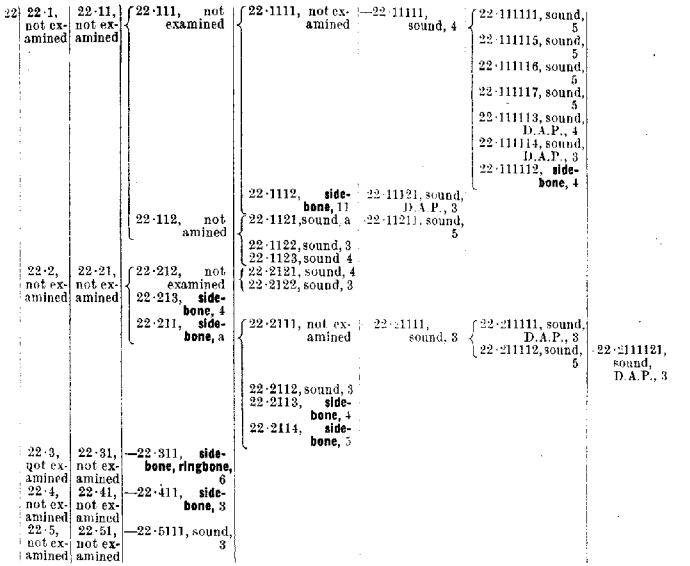
Nine grandsons of 21 were examined, and three, or 33.3 per cent., were unsound, but as the sound members were all aged horses at time of examination, the factor for unsoundness is not strongly developed, if at all, and the family may be regarded as a sound one, with unsoundness introduced from mares. The pedigrees of the unsound members are not clear, but—

21.11 appears to be from a mare by a brother of 11.21.

21.101 was from a mare by 7.4923, a doubtful family.

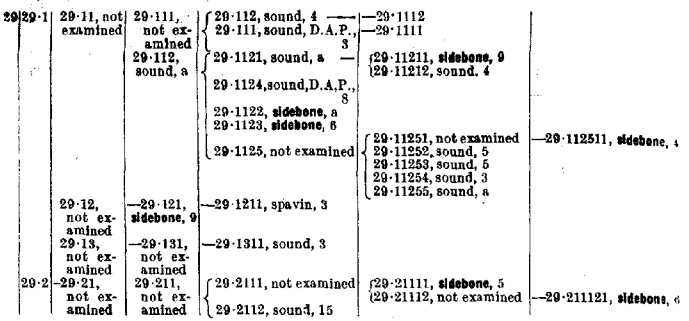
21.16 was by an unrecorded son of 9.5, a doubtful family.

FAMILY 22.



The relationship of this family to Family 1 has already been pointed out, and frequent reference has been made to members of it owing to unsoundness through the female side of pedigrees. Of the progeny of 22 28.5 per cent. of those examined showed unsoundness. Particularly is this seen in the great-grandsons, four out of five being defective. Recognising the connexion with Family 1, there is every reason to believe that unsoundness predominates in the early branches, and is becoming a diminishing factor in the later generations.

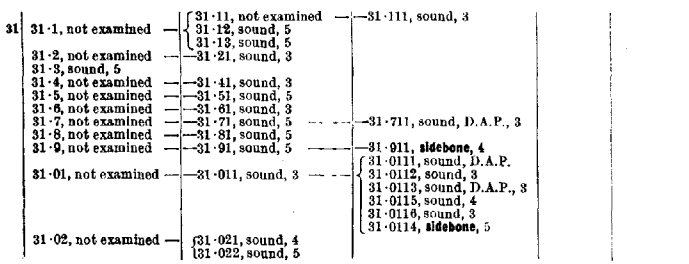
FAMILY 29.



Family 29 is reproduced for reference in dealing with other families, and to show the connexion which occurs through some of the dams.

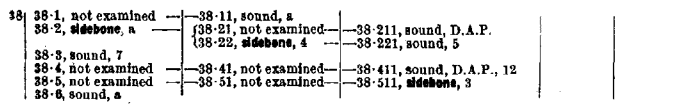
Twenty members have been examined, and seven, or 35 per cent., found unsound. Unfortunately, the pedigrees of the dams of these do not connect with any of the horses in these tables, so that it cannot be said whether the unsoundness present has been introduced on the female side or is inherited from the sires. The former is most probable.

FAMILY 31.



Soundness is the predominant factor in this family, which has 22 representatives, two of which, or 9 per cent., are unsound. Unfortunately, the dams of the unsound ones cannot be traced, but it would appear that they are responsible for the two instances recorded, else more unsoundness would be found in the family.

FAMILY 38.



The founder of Family 38 has frequently been referred to as being present in unsound pedigrees, but there are not sufficient members in this particular family to give a true indication of the degree of its unsoundness. Nine members only were examined, and three, or 33 per cent., were unsound. 38.2 was one of the worst cases of sidebone I have ever examined. His dam was by a son of 1. From the character of his unsoundness, there is no doubt that he inherited the unsound factor from both sides. The dam of 38.3 was by 17.1, which is the sire of a sound line as far as can be seen. The dam of 38.6 was by a horse not recorded in these tables, but which appears on the dams' side of several horses that are sound, and at no time has he been noted in the pedigree of an unsound horse. It is, therefore, possible that in both 38.3 and 38.6 clean blood on the dams' side has counteracted the taint of 38, whilst 38.5 was probably unsound.

(To be concluded.)

FRUITING OF APPLE TREES EVERY OTHER YEAR.

Many varieties of apples and pears, for various reasons, bear only every other year, while the same is true, but to a less extent, of the stone fruits. The causes are somewhat varied, but are considered to be mostly the result of the climatic environment in which the trees are grown. The biennial bearing habit is apparently not an inheritable trait, but when it once becomes fixed in the life of the individual, there is little that can be done to change it.

The habit becomes fixed in climates where frosts and rain interfere with the set of fruit, and where the young trees are not properly pruned and the fruit thinned.

An interesting illustration of this perennial bearing habit is quoted by B. S. Brown in the *Journal of Heredity*. One-half of the tree had been grafted to a Gravenstein, while the other half was of the original variety of a Russian type. For some unaccountable reason each half of the tree chose opposite years for its heavy crop. In the spring it presents an odd appearance by one-half being in heavy bloom, while the other half scarcely develops a single blossom. The next year the process is reversed.

The tree is about 25 years old, and has behaved as described for the past five years. No certain explanation as to the original cause can be given. As there is some slight difference in the blooming time of the two halves, it is possible that frost may have come at such a time as to destroy the fruit on one side while the other escaped.

It is interesting for two reasons. First, that it indicates that the formation of fruit buds is not wholly a question of nutrition. Second, that the food supply of the tree is directed first to the needs of the maturing crop.

—*Agricultural Gazette of New South Wales*, June, 1919.

THE AUSTRALIAN FLORA FROM AN ORNAMENTAL ASPECT

By Edward E. Pescott, F.L.S., F.R.H.S., Pomologist.

(Continued from page 364.)

Pests of the Wattle.

Wattles, like all other garden plants, are frequently attacked by pests, which cause the gardener some considerable trouble. *Acacia saligna*, the Willow wattle, is very subject, along with others, to stem-boring caterpillars. If the pest be discovered in time, the bore which it has made in the tree should be searched out with a piece of copper

Sunshine Wattle (*Acacia discolor*).

wire and a few drops of phenyle poured into the opening, which may then be plugged up with clay. The sawdust-like excreta and gumming will usually reveal the presence of the borers. If the tree has become so badly infested that it cannot be satisfactorily treated, it should be cut down, and quickly burned.

A serious and increasing trouble, especially in areas where there are many gardens, is the presence of gall-making insects. These pierce the young flower buds, causing them to swell globularly, so that instead of flowers, bunches of galls, larger than a green pea, develop. The Cootamundra wattle (*Acacia Baileyana*) is especially subject to this pest. When the galls appear they should be cut off and burned. It is not sufficient to merely cut the galls away, for if allowed to remain on

the ground they continue to breed the insects, which, when fully developed, infest the next crop of flower buds.

The leaf miner is another serious pest, and it is specially affecting the Willow wattle (*Acacia saligna*), *Acacia prominens*, and the Mount Morgan wattle (*Acacia podylariæfolia*). A small fly lays her eggs under the epidermis of the leaves. From the eggs are hatched very small caterpillars, which eat the substance of the leaves under the outer skin, mining and tunnelling them, and making the tree very unsightly, and ere long the foliage drops off. This pest also attacks such garden plants as sunflowers, marguerite-daisies, and cinerarias; and also the common weeds, sow or milk thistle, and the English dandelion. To minimize the plague, the weeds should be kept in check, and immediately after each flowering season the affected bushes or trees should be well pruned, cutting off all the parts attacked, and burning them at once. Then the pruned plants should be sprayed with any benzine or benzole emulsions, or with tar or phenyle waters.

Sometimes brown rusty-looking galls appear on the wattles in the form of large irregular swellings. These are the results of attacks of gall-making rusts, and the galls should be cut off and burned.

Should any leaf-eating insect attack the foliage, the tree may be sprayed with a weak solution of arsenate of lead.

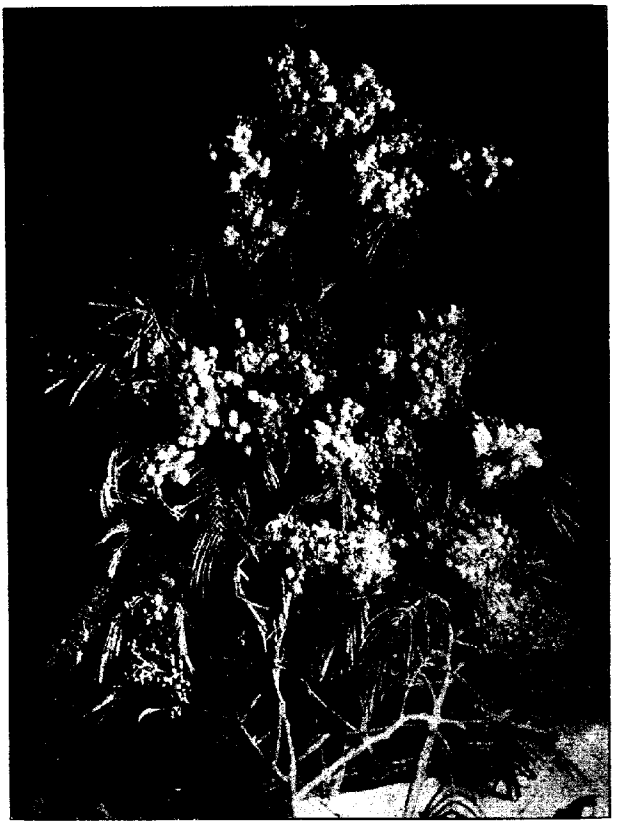
Cootamundra Wattle, after cutting hard back.

Considerable trouble and damage are experienced in South Africa as a result of attacks on wattles by the caterpillars of the "bagworm." There are species of bagworms here, as well as allied forms of stick case moths, and it is possible that these pests may do serious harm to the wattles in the future. A pest that occasionally does damage to wattles in Australia is the larvæ of the fire blight beetle of the wattle, *Paropsis orphana*. Large plantations of black and silver wattles, which were grown for the bark, have been killed by this pest, which works very rapidly.

African experiences with the bagworm, which, like the fire blight beetle, attacks the foliage, have shown that the best means of combating it is by means of "dust-spraying." Dust-spraying is in vogue in America, and special machines are used for the purpose. The dusts used were:—(*a*) Paris green and lime, 1 in 10; and (*b*) arsenate of lead and lime, 1 in 20. The powder was applied at the rate of 100 lbs. per acre, and an even distribution killed from 70 to 76 per cent. of the larvæ. The trees then recovered quickly. Thus the dust spray, on large areas, may prove very valuable for all leaf-eating pests.

Pruning of Wattles.

The pruning of wattles is usually restricted to cutting back and shaping the trees, so that they may be kept within bounds and not become too straggly, thus making low-growing shrubs not too woody. Therefore, the taller and the spreading growths should be pruned out, so that the trees may be of uniform growth. There is only one season



Silver Wattle (*Acacia dealbata*).

at which to carry out the pruning, and that is at the time of, or immediately after, the flowering. It is then that the sap-flow is at a maximum, and by pruning at that time the subsequent growth will be stronger. If at any time the tree has grown so large as to need a considerable reduction, it may be pruned very hard back and most of the growths

and branches cut away, reducing it, if necessary, almost to bare poles. This work must be done at flowering time, and at no other time. The illustration shows a Cootamundra wattle so pruned. If large wounds or surfaces are exposed as a result of this pruning, they may be covered with a coating of pure white paint to preserve the wood and prevent decay.

Sallow Acacia (*Acacia longifolia*).

In training the young tree, especially where it is needed for garden or shrubbery work, or where it is grown on a lawn, the tip should first be pinched away when the plant is a foot or 15 inches high. That will cause it to break out low down into several growths and ultimately grow into a fine bush shrub, breaking away with several branches or stems quite close to the ground. This is by far the best method of treatment for the growing of such brittle-wooded trees as *Acacia saligna* (Willow wattle), *Acacia macradenia*, and *Acacia cyanophylla*.

Several of the wattles are most suitable for hedge plants, in which situation they may be planted about 3 or 4 feet apart, and should always be kept shaped and pruned after the flowering. Suitable hedge species are *Acacia Howittii* (Sticky acacia), *Acacia* armata (prickly)

"**Wirilda**" (*Acacia retinodes*).

(Hedge acacia), *Acacia acinacea* (Gold Dust acacia), *Acacia cultriformis* (Knife Leaf wattle), *Acacia vestita* (Hairy acacia), *Acacia prominens, Acacia dodonœfolia,* and *Acacia suaveolens* (Sweet acacia).

Raising Wattles from Seed.

All species of acacia may be readily raised from seed, which should be sown either in March or August, preferably during the latter month.

All wattle seeds are specially provided with a strong moisture and air-resisting coat, so that they will retain their vitality for a great many years. The age of wattle seeds need not debar any one from planting them, for they will grow if planted half a century or even longer after gathering. The hardiness of acacia seeds may be judged when R. H. Cambridge, F.L.S., records that on one occasion a seed of *Acacia Farnesiana* germinated after having been soaked in sea water for three and three-quarter years. It was then placed in boiling water, and in seven days after planting the seedling appeared. Another seed was kept in sea water for three months and planted after a soaking in boiling water. This seed remained in the soil for 23 months and then germinated. Some seeds germinate more readily than others, notably *Acacia armata* (the Hedge Acacia), the seeds of which grow so freely that it has become a pest in many places.

If the seeds are placed in a cup and boiling water poured over them, and they are left soaking all night, they may be planted in sandy soil the next morning.

When the seedlings are a couple of inches in height they may be transplanted into small pots, and in three or four weeks the young plants will be ready for planting out. The younger the plant at the time of planting, the quicker and better will be the resultant growth.

Structure of the Wattle Flower.

If a round head or spike of wattle flower be examined, particularly when in bud, it will be noticed that the structure is very knobby, there being many very small globular knobs present. Each of these knobs represents a bud, so that, when opened, a round globular flower-head of wattle is not one flower only, but it is composed of many individual flowers, each very small. This partially explains the non-lasting qualities of the flowers. Although, if protected in a bag or tin or by paper when gathered, and the stems dipped in boiling water as soon as possible after cutting, the flowers will keep fresh for quite a long time.

Best Australian Wattles.

It is not here possible to discuss any large proportion of the many beautiful wattles with which Australia is endowed. That would take a book in itself. Many splendid species, such as *Acacia notabilis, Acacia subporosa,* and others, have not yet been brought into cultivation. But a list of a few of the very best is given hereunder in alphabetical order. The month named as the blossoming time is approximate (as, like all other plants, the wattles differ in localities and positions in their flowering season), and is for Melbourne—Sydney, Brisbane, and Adelaide would be earlier, and Hobart later.

The Plant Names Committee of the Field Naturalists' Club of Victoria is at present engaged in revising a list of common names for all native plants. Many acacias, especially those not found in Victoria, have not yet received a general common name. Therefore, in the following list where no common name is given, it will be understood that such has not yet been agreed upon:—

Acinacea (Gold Dust Acacia).—Dwarf, good for hedges, small roundish foliage, yellow flowers. September.

Armata (Hedge Acacia).—Shrubby, prickly stems, small foliage, large flowers—yellow and orange; a fine protective hedge. September.

Baileyana (Cootamundra Wattle).—A tree, glaucous feather foliage—one of the best, deep yellow flowers of drooping habit. August.

Binervata.—Shrubby, large broad leaves, flowers nearly white. November.

Buxifolia.—Shrubby, small roundish leaves, flowers yellow. September.

Calamifolia (Wallowa).—Shrubby, long narrow leaves, yellow flowers, decorative and good. September.

Cardiophylla (Wyalong Wattle).—A good tall shrub, foliage daintily feathery, flowers yellow and small; a fine species. September.

Cultriformis (Knife Leaf Wattle).—Shrubby, foliage small triangular, bluish, flowers yellow in large trusses. October.

Cyanophylla.—A large shrub, like *Saligna,* blue-green foliage, fine large drooping trusses of orange flowers; one of the best. November.

Dealbata (Silver Wattle).—A tree, bluish feathery foliage, fine trusses of rich yellow flowers; does not thrive well in gardens, good in moist tree reserves. September.

Decora.—A fine shrub, small bluish leaves, beautiful trusses of yellow flowers; a very good species. September.

Decurrens normalis.—A glorious tree, foliage beautifully green and feathery, flowers large and in fine trusses; one of the most beautiful trees. September.

Discolor (Sunshine Wattle).—A small shrub, glossy pinnate foliage, fine heads of good yellow flowers. March.

Dodonæfolia.—A good shrub, foliage small and glossy, flowers large and orange; a fine form. October.

Elata (Cedar Wattle).—A fine tree, tall, with bold pinnate foliage, very large trusses of pale-yellow flowers. February.

Elongata (Long-pod Acacia).—A distinctive shrub, long narrow foliage with fine rich globular heads of flowers. September.

Farnesiana.—A good shrub, prickly, small pinnate foliage, flowers large and golden. February.

Glaucescens.—Quite one of the best, a tall shrubby tree with narrow glaucous foliage, flowers in long spikes. September.

Howittii (Sticky Acacia).—Shrubby, with dainty growth, small leaves, and abundant pale yellow flowers; makes a good specimen or hedge. September.

Implexa.—A small tree, the Lightwood, curved narrow foliage, flowers sweetly scented, nearly white. February.

Iteaphylla.—A tall shrub, roundish long foliage, good yellow flowers. October.

Jonesii.—A charming low shrub, feathery foliage, habit somewhat straggly, flowers large, orange. September.

Leprosa (Leper Acacia) with its two varieties *Elongata* and *Tenuifolia.* Tall shrubs, with drooping habit, narrow foliage, good yellow flowers. September.

Linearis (Narrow-leaf Acacia).—A tall shrub, long narrow foliage, with creamy yellow flowers in spikes. Flowers in September, but frequently also in February.

Longifolia (Sallow Acacia).—A fine shrub, long leaves, flowers in long spikes of a rich yellow; one of the best for withstanding city dust.

September. Its variety, *Sophoræ*, has shorter and broader leaves, with shorter and longer spikes. The variety *Floribunda* has similar leaves, but with very abundant spikes. The variety *Mucronata* has very thin narrow foliage.

Maideni.—A tall shrubby tree, foliage long and narrow, flowers very pale in small spikes, fragrant. March.

Melanoxyton (Blackwood).—A tall tree, broad leaves, white fragrant flowers. October.

Mitchelli (Mitchell Wattle).—A low shrub, small pinnate foliage, flowers yellow, small. October.

Myrtifolia (Myrtle Acacia).—A low shrub, foliage roundish and small, flowers creamy and yellow. Its variety *Celastrifolia* has very large leaves.

Notabilis.—A handsome shrub, tall; large, rich, yellow flowers. Spring.

Obtusata.—A good shrub; roundish, obtuse, bluish foliage, flowers a rich yellow. September.

Podylariæfolia (Mount Morgan Wattle).—A fine shrub, foliage very glaucous blue, triangular in shape, flowers golden, habit drooping; quite one of the best. May, June, July.

Polybotrya (Silver Mulga).—After the habit of the Sunshine Wattle, but with bluish foliage, having very many flowers in large racemes. Spring.

Pravissima (Ovens Acacia).—A good shrub, foliage triangular, bluish, fine trusses of many small yellow flowers. September.

Prominens.—A good tall shrub, makes a good hedge or breakwind, foliage small, flowers small in very large trusses; a really good form.

Pruinosa (Frosty Acacia).—A tall shrubby tree, foliage lightly pinnate, bronzy when young, flowers in creamy racemes. February.

Pubescens.—One of the finest, greatly favoured in America, a small tree with glaucous pinnate foliage and fine free flowering habit. Spring.

Pulchella (Beautiful Wattle).—A low shrub, foliage small pinnate, prickles on stem, flowers many, small, yellow. November.

Pycnantha (Golden Wattle).—The finest of all for bloom, a tall shrubby tree with broad green foliage, flowers in large trusses of large golden balls. August, September.

Retinodes ("Wirilda").—A shrubby tree, foliage long and narrow, flowers yellow, flowers nearly all the year.

Riceana.—A shrubby tree, prickly, small foliage, pale cream flowers. September.

Salicina (Willow Acacia).—A good tree, long foliage, with fine golden flowers. September. Its variety, *Wayæ*, is more slender in growth, with broader foliage.

Saligna (West Australian Willow Wattle).—A shrubby tree, foliage long and green, habit drooping and weeping, especially when in flower, flower-heads large and golden; one of the best. November.

Spectabilis.—A sparse shrubby tree, foliage pinnate and glaucous, flowers in weeping racemes of rich gold; a grand species. October.

Suaveolens (Sweet Acacia).—A low straggling shrub, leaves narrow and rounded, flowers creamy and very fragrant. May, June.

Undulifolia.—Ornamental and fine in flower, a straggling shrub, rather spreading. Spring.

Verniciflua (Varnish Acacia).—A good shrub, with small, bright, green leaves, somewhat sticky. September.

Vestita (Hairy Acacia).—A low shrub, with triangular bluish foliage, and with fine spikes of ample yellow flowers; one of the finest. September.

AGRICULTURAL EDUCATION IN VICTORIA.

In the editorial columns of the *Experiment Station Record,* published by the United States Department of Agriculture at Washington, some interesting comments are made on Mr. Richardson's report on Agricultural Education in America.

The editor says, *inter alia*:—"Two reports have recently come to hand which are worthy of special mention. One of these is a report by Mr. A. E. V. Richardson, Agricultural Superintendent in the Victorian Department of Agriculture, and records the results of a personal study of agricultural institutions in this country and Canada on a six-months' mission. It is a highly intelligent and accurate expositoin of the American view of agricultural education and the spirit and motive of agricultural institutions. It is appreciative not only of what has been accomplished, but of what has been passed through in the process of development.

"Mr. Richardson writes as one who has seen and understands, and who has weighed the results as now exhibited in full light of their evolution. This gives him advantage in making application to his own country, and adds force and conviction to his recommendations. Incidentally, the comparisons he makes throw an interesting light on conditions at present prevailing in Victoria, which in many respects parallel in opportunity the situation in this country before our system for agricultural advancement had been put well under way.

"Special interest naturally centres in the applications of his studies to Victoria. He explains that one great advantage which has come in America is a strong national sentiment towards agricultural education and agricultural development, which is lacking as yet in his country. He lays very strong emphasis on agricultural education, considered broadly, as an essential basis for development. He says:—'The only way to secure a genuine and permanent increase in output from the land is to improve the farming methods of the country and apply the teachings of science to its agricultural production. In other words, the problem of agricultural development resolves itself ultimately into the problem of agricultural education. That is the clear lesson of experience in all the great agricultural countries of the world.' But he cautions that a long time is required to realize on educational work, especially when the necessary force and the means for training such a force are lacking.

"There is declared to be no State in the Commonwealth so dependent on the development of intensive agriculture as Victoria; hence it is argued that education in agriculture is of prime importance to it. Unlike the adjoining States, it has no large area of Crown lands to dispose of for the settlers of the future. It is by far the most densely-populated State, and land values are relatively higher than in any other.

Hence intensive culture and diversification are pointed to as the chief avenues of progress, and these naturally lend special importance to education.

"A lesson cited from American experience is that, 'No matter from what angle the problem of agricultural education be viewed, it resolves itself ultimately into the problem of providing a sufficiency of trained teachers, agricultural specialists, and extension workers, and using them as units in an organized scheme of instruction, investigation, and extension.' It took this country a generation or more to learn this, but it is one of the most fundamental lessons out of our experience, and it will be a saving of time and disappointment if it can be profited by in newer countries.

"With a view of training such a corps of workers, suggestions are offered for modifying and strengthening the course and facilities in agriculture of the University of Melbourne. The provision at present is held to be wholly inadequate to the modern ideas of college teaching, and until it can be enlarged the suggestion is offered that the staff of the Department of Agriculture be used, and the facilities of the Werribee Research Farm or the Dookie Agricultural College employed, for the necessary practical work. Scholarships in American institutions are advocated to provide trained specialists in technical subjects; and to encourage more men to prepare for this field the insurance of larger emoluments for services is urged. In this connexion it is noted that the University Council has asked that the Government appoint six graduates annually for a period of five years at a salary of 1,500 dollars a year.

"Comparing the two agricultural colleges of Victoria with those in this country, it is shown that they differ fundamentally, and that the former are really vocational schools, giving as much attention to acquiring manual skill and dexterity as to technical and scientific training. The writer explains that 'The Americans emphasize the fact that the true function of a college is to teach why things are done rather than how they should be done'; and that, in the American colleges, 'Practically the whole time is devoted to technical and scientific training and subjects which make for good citizenship'.

"The two existing colleges attract few farm boys, but might, it is urged, if the type of instruction were provided which is adapted to their needs. A strong plea is made for liberalizing their courses, for increasing and strengthening the staffs, and for enlarging the facilities for instruction. Citing the success of short courses in the United States and Canada, the encouragement of these in every possible way is advocated.

"The plan does not end with the university and the agricultural colleges, but includes instruction of lower grades. A State supervisor of agricultural instruction is recommended for the high and elementary school work, and central and district schools for preparing teachers for the elementary grades.

"The report has much to say on the subject of experiment stations and agricultural investigation, which are regarded as absolutely fundamental to other educational development. The author holds that 'The building up of a body of systematic knowledge by careful investigation and experiment is essential for the sound development of agriculture in any country,' and that a comprehensive system for this must run parallel with the work of instruction and extension.

"The field for agricultural investigation in a new country such as ours is vast, and at the present time we are largely dependent for what may be termed the scientific basis for agriculture on principles established under climatic and economic conditions unlike our own.

"There is a wide field of work in the confirmation of what are supposed to be the basic principles of our great national industry. It was the systematic tests conducted by the American experiment stations on the growing of crops, management of soils, feeding of animals, which played such a large part in developing American agriculture. These stations demonstrated the practicability of very largely increasing the existing crop yields by measures within the reach of men of average intelligence, and at a cost which could be recovered with large dividends in increased crop production. The American stations played a large part in the development of American agriculture, and in creating sentiment towards agricultural education.

"Unlike this country, the experiment stations in Australia are under the State Departments of Agriculture, along with the inspection and other administrative functions. While this is not commented upon, attention is drawn to the association of research with teaching and extension in the agricultural colleges of this country. Experimental work in Victoria is centred in the research farm at Werribee, established some six years ago, which, in addition to being young, has felt the shortage of skilled assistance. Hence a vast amount of experimental and research work remains to be done, which it is felt should be begun at the earliest possible moment. Although the future progress of agriculture in Victoria lies in the intensification and diversification of agriculture, and particularly in the development of systematic stock feeding, it is explained that practically no local information is available on the merits or costs of different feeding systems, or of the available feeds. Similarly lack of information is felt on the proper use of water in irrigation, crop rotation, fertilizers and their effects, and in many other directions. This leads the author to plead for generous support for extending the scope of our agricultural investigations, and providing facilities in the way of staff and equipment to carry out a vigorous policy of investigation.

"Provision for farm surveys and for agricultural extension work is also advocated, but here again the lack of trained and experienced men is recognised as a practical difficulty at the present time.

"Mr. Richardson has caught the idea that in America agriculture is regarded as both a business and a mode of life, and that the development of agriculture is a public concern; hence money spent upon it is not an outlay, but an investment. This, he explains, is the reason why State and Federal Governments are content to make large appropriations for agricultural education as an underlying means of development. Based on this idea, and the returns from it, he argues for a long-range policy which will look beyond the present and map out the requirements of the State, making provision for the steady realization of these plans in the future.

"It does not necessarily follow that what is good policy for one country will be equally good for another, but the value of agricultural education and investigation has been given such wide and convincing demonstration as to show their soundness for new regions quite as surely as for the older settled ones. This excellent report will furnish a reliable basis for agricultural development through education and research."

PLANS OF A SHEEP DIP.

A. W. Curlewis, Stock Inspector.

The following is the description of a sheep dip recently constructed by Mr. J. F. Laffan, "Inverlocky," Wallan, who very kindly supplied me with all particulars, including cost of material and labour, and also with a plan.

The bath is circular, with a centre pillar, or "island," similar to one of those described briefly, from a plan supplied, in a former issue of the *Journal*. Mr. Laffan, however, obtained the idea of his dip from another source, and having used it this year (dipping rather late), is thoroughly satisfied with it in every respect. In my opinion it is very suitable for dipping small or moderately large flocks, and is economical in the matter of quantity of dipping material used. The owner states that after putting his lambs through there was left only about 2 feet depth of wash, representing 330 gallons. (Three feet in the bath represents 550 gallons.)

Material.—For bath and ramp, bricks grouted in cement were used, and for draining yards cement concrete.

Construction—Bath.—Brickwork of 9 inches, the walls backed up or puddled with 6 inches of good "pug," and faced or rendered on the inside with half-inch of cement mortar, one part cement to three of good sand (washed).

The wall or pillar is of same material, the centre being filled with pug concreted over, and finally rendered with cement mortar.

Dimensions.—Eight feet in diameter at top (inside), and 6 ft. 4 in at bottom, depth 5 ft. 6 in.

The pillar wall is 4 ft. 4 in. in diameter at top, and 4 ft. 8 in. at bottom, thus leaving a circular space of 1 ft. 10 in. at the top and 10 inches at the bottom, varied slightly, however, by the pillar being drawn in a little opposite the "slide-in," to allow more room for the sheep to drop in.

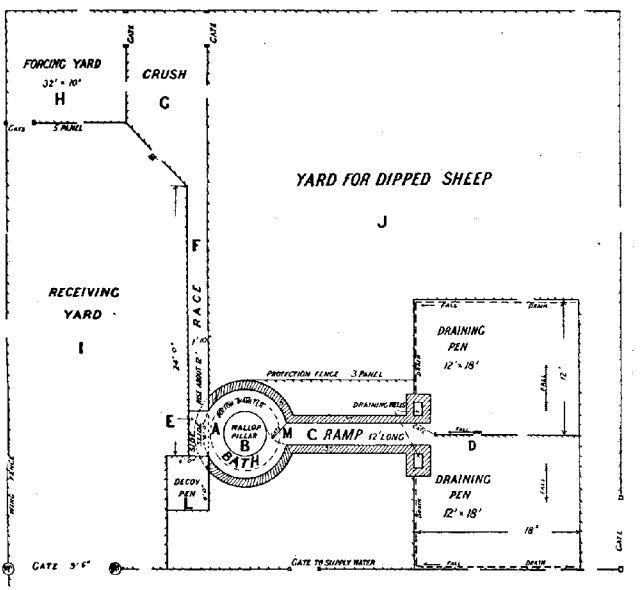
At left of exit to ramp a strong 1 ft. 9½ in. gate is swung, 1-ft. 6-in. gudgeons being passed through brickwork and pug, and bolted to sleeper on outside. This gate, when closed, prevents sheep leaving the bath until thoroughly dipped, and when opened turns them into ramp.

The ramp, or "walk out," is 12 feet in length, 1 ft. 10 in. wide, and slopes upwards from 5 ft. 6 in. to the surface of draining yards. A movable grating, like a ladder, fits into floor of ramp, to give the sheep a good foot-hold, and the end butts up against a brick flange at the foot. This is an important detail, and being movable, it can be taken out and the ramp cleaned easily.

Draining Yards.—Two, each 12 x 18 feet. In the centre fence there is a gate swung on the end opposite the "walk-out," so that the yards may be used alternately. Fall from centre fence to drain, on outside fence, 1 in 4, and fall from end of yards to bath, 1 in 7. There is a half round drain, 2½ inches deep in centre and 1 foot wide, down both sides and along end to draining wells. The drain is sloped up to a stone edging (grouted), under bottom rail of fence. The draining yards have a foundation of bluestone rubble, levelled off with coarse, and then fine, sand, on which is laid the floor of cement concrete, 6 inches thick, faced

or rendered ½ inch with cement mortar, 1 in 3, as used for bath. Draining wells, one on each side of "walk-out," are 9 in. x 1 ft 3 in. x 1 ft. 8 in. in depth, and there are 4-inch earthenware pipes 4 feet long inserted just under surface, to carry the wash back to the ramp. The wells are cleaned out each morning of dipping, and skimmed as required as the work goes on.

Yards.—From convenient receiving yards the sheep pass to forcing yards, 32 feet long and 10 feet wide at lock. Two panels on far side from dip form an irregular V, as shown on plan, leading to race, 1 ft. 10 in. wide, 23 feet long. Decoy pen, 4 x 4 feet, at the head of race. Side slide into bath is 4 feet long, and sloped at an angle of 45 degrees (11 in. in 22 in.). "Blind" of tongue and groove, ½ inch ceiling boards, to be swung with pair of T-hinges over slide, in place of hessian temporarily fixed.



Mr. Laffan has a marked stick, for measuring at various depths, to ascertain, or to test, the quantity of liquid in bath. He also uses a home-made skimmer, consisting of a tin, punched with numerous holes, from inside, through which a stick is fixed at oblique angle, as well as a plunger for stirring the wash, and crutches for immersing the sheep.

The following are details of the quantities and cost of material, including fencing and cost of labour. As Mr. Laffan desired to make a thoroughly good dip, nothing was spared. Probably some economy might be made without impairing the efficiency of the bath by having 1½-inch walls instead of 9 inch, and less substantial fencing could be

erected; and for small lots of sheep, both the bath and draining yards might be made smaller.

	£	s.	d.
Material—			
18 bags cement, at 5s. 6d.	4	19	0
2,650 bricks, at 45s. per 1,000	6	0	0
7 yards rubble, at 6s.	2	2	0
6 yards coarse gravel, at 6s.	1	16	0
4 yards sand, at 6s.	1	4	0
Fencing—			
28 round posts, at 5s. each	7	0	0
50 split posts, at 70s. per 100	1	15	0
200 rails, at 120s. per 100	12	0	0
Gates—			
13, including hinges and labour	13	0	0
Labour—			
Bricklayer, 7 days, at 20s.	7	0	0
Fencer, 17 days, at 9s. and keep	9	0	0
Two men assisting at times, say	5	0	0
Carriage—			
Rail on bricks, &c.	5	0	0
Total	£75	16	0

BEE PARALYSIS.*

By F. R. Beuhne, Government Apiarist.

Bee paralysis is a disease of the adult bee, and probably a germ disease. No germ, however, which can be considered the cause has up to the present been discovered. It is a contagious disease, but infection takes place only by direct contact between affected and predisposed bees. Infection is not carried by brood, combs, honey, or pollen. In dealing with this trouble it is important that these factors should be understood. The symptoms of bee paralysis vary at different stages of the disease, and also with the age of the bees affected. The first indication is sometimes the presence in the hive of a few shiny, oily, and emaciated looking bees; at other times, the first sign is a few bees with abnormally inflated abdomen. Their movements are jerky, the legs extended sideways, the wings spread out and showing a twitching movement at short intervals. In a short time the number of bloated bees increases; they may be seen leaving the hive and dying after crawling a short distance. When the hive is opened some of them come on to the top of the frames and refuse to move when smoke is blown in on them. During the early stages of the disease the sick bees are generally being pulled about, and sometimes dragged out of the hive by other bees. The oily appearance of some of the affected bees is due to the hairs on their bodies having been pulled off, and this is perhaps one of the ways in which infection is transferred from bee to bee. When the disease reaches the final stage even newly-hatched bees will become infected. They do, however, not show the

* Paper read at Apiarists' Conference at Maryborough, June, 1919.

characteristic bloated abdomen, but look quite normal; they crawl out of the hive and die. One peculiarity of bees dying from paralysis is that the process is very gradual. A bee picked up apparently dead will move its legs, and hours afterwards warmth will cause it to move still. The healthy bees of an affected hive try to remove the sick bees and drag dead and dying out of the entrance, and in this effort they become themselves affected. Possibly infection also takes place by the older bees feeding the younger ones. But in whatever way it is communicated it infects only bees of the same colony or of the same strain. So when we take away all the brood from a colony affected with paralysis and put in its place the brood from a resistant stock the young bees hatching from it, although surrounded by infected bees, will not become infected, and as the old bees die off the hive becomes free from disease. Unless, however, the queen is replaced at the same time, there is every likelihood of paralysis again breaking out. The brood taken away from an infected colony can be given to any colony free from the disease, and there will be no outbreak provided that no bees are transferred with the combs. This seems to prove conclusively that combs, brood, honey, and pollen do not carry infection, and that young bees only become infected after hatching by contact with the diseased bees. Bee paralysis is a disease which is more prevalent and more virulent in hot than in cool climates. In the United States of America paralysis is a formidable disease in the warm southern States, while in the cooler northern latitudes there are merely indications of its presence. In Victoria it is sometimes of a very virulent type north of the Dividing Range, while in the coastal country it is hardly noticeable. If it were correct that the warmer the climate the severer the disease, then we should expect it to be worse in the northern States of Australia than in Victoria. However, I am not aware that such is the case. There are probably other factors than latitude, such as food and elevation, &c. I do not know whether bee paralysis is more prevalent in the northern latitudes, which correspond to the southern in America; but I do know that queens and their queen and worker progeny obtained from localities in which paralysis is practically unknown, often develop the disease in a virulent form when introduced into apiaries from which paralysis has been eliminated. Judging by this experience we must assume that paralysis is not in evidence in the northern States, for I know of quite a number of instances of outbreaks of this disease amongst the progeny of the queens obtained from there, and I am quite sure that no queen breeder would breed and send out anything likely to bring him into disrepute. There are numerous instances of paralysis breaking out amongst the bees of queens introduced into an apiary from outside the State, while the local strain remained unaffected. I will only give one personal experience. Some 50 colonies of bees, from an apiary without a sign of paralysis, were sent to me some years ago from a distance of 200 miles. There was not the least indication of paralysis in my own apiary, to which the new arrivals were added. Yet, within a short time, nearly every one of the newcomers developed paralysis of a very virulent type. All were re-queened in due course from the local strain, and in time the symptoms disappeared, while none of my own colonies were affected. In view of the experience of many apiarists, there can be no doubt that by a process of weeding out and select breeding from

the most vigorous stocks, a more or less immune strain of bees can be established. Having established a comparatively immune strain of bees, this immunity is not easily maintained. In the process of eliminating paralysis there may be a loss of colour and an addition of temper, and the apiarist comes to the conclusion that he must introduce fresh blood. Being unable to get it from a locality similar to his own, he goes farther afield. He gets colour and gentleness, and, very likely, also paralysis. Sometimes it does not show in the hives with the new queens till the following spring. In the meantime some of the young queens of his own strain have been mated to drones of the new kind, and thus the predisposition to paralysis is incorporated again in the apiary. Incidentally, I should like to say here that there is often no need for new blood, and queens are sometimes introduced only with the idea of preventing in-breeding. There need be no fear of in-breeding as long as intelligence and common sense are used in selection of breeding queens. When it is necessary or expedient to obtain queens from unknown sources for breeding purposes, caution should be exercised, and only a limited number of young queens raised during the first season. If these and the parent colony pass through the following winter and spring without indications of paralysis, then re-queening can be practised on a more extensive scale. There is no cure for bees affected with paralysis, and the only treatment at all effective is to replace the affected and pre-disposed with others immune to the disease. This is done, when the disease is only of a mild type, by replacing the queen with one of another strain. When a colony is badly affected, it is necessary to change the brood at the same time, otherwise there may not be enough active bees left in the hive by the time the brood from the new queen begins to hatch. Even in the worst cases, when there are not enough bees left to be worth saving, there is no need to destroy or waste the brood. It may be given to unaffected colonies without risk, provided that no bees are transferred with it. To sum up the position in regard to bee paralysis, the following points may be recommended:—(1) Don't try to cure paralysis with sulphur, salt, or any other remedy; these only affect the symptoms without removing the cause. (2) Don't breed from queens producing highly-coloured bees and queens, particularly those having an abnormal amount of brood—a sign of weakness. (3) Destroy and replace the queens of any colonies showing the slightest symptom of paralysis, no matter how beautiful and gentle the bees, or how prosperous the colony may be. (4) Introduce new blood cautiously, and, as far as possible, from districts in which paralysis has run its course.

THE Egyptian hen, it is curious to note, does not possess the sitting instinct. This is attributed to the practice of artificial incubation, which is generally followed in Egypt. It is contended by those who have investigated the subject that the art of hatching eggs by artificial heat originated in Egypt in very remote times.—*Times Trade Supplement*, February, 1919.

FARM NOTES FOR MAY AND JUNE.

RESEARCH FARM, WERRIBEE.

The Research Farm is situated in the well-known hay-growing district of Werribee, about 20 miles from Melbourne. The average rainfall is about 21 inches annually.

The farm manager, Mr. H. C. Wilson, in his report on the operations for May and June, states that the farm teams were able to commence cultivation early this year, thanks to the exceptionally heavy rains in February and early March, when nearly 9 inches were recorded. Subsequently, however, no rain fell until 23rd May, so that the two critical sowing months of the year were dry. During June, 119 points were registered.

The oat crops sown during the dry spell have germinated rather patchily, particularly on the clay land. In the "shandy" crops of Algerian oats and Warden wheat, intended for hay, it was noticed that the oats germinated much better than the wheat during the dry spell. Rape sown immediately after the March rains suffered during the dry spell, but freshened up considerably with the inch of rain which fell in May.

Owing to the persistent dry weather experienced during the normal sowing months, farmers in the district were faced with the prospect of either sowing wheat dry or of holding off till rain fell, in which case they took the risk of having to sow late under conditions unfavorable alike to germination and effective and continuous work.

At the Research Farm, in view of the large area to sow, it was decided to risk the possible malting of the grain and to sow dry, and the sowing of wheat was, therefore, commenced on 16th May on a dry seed bed. The rain which followed a week later has resulted in an excellent germination.

During the present season 805 acres have been sown on the farm, comprising: Wheat, 220 acres; oats, 140 acres; "shandy," 210 acres; barley, 100 acres; rape, 60 acres. In addition, 75 acres have been sown in the experimental plots.

The farm manager finds that the hay made from Algerian oats and Warden wheat sown together, or "shandy," as it is called, is superior to that from either of the cereals sown by themselves. It is found to be very palatable, to retain its colour, and to weigh heavily.

The following varieties of wheat have been sown in bulk areas for distribution to farmers in 1920:—Federation, Penny, Yandilla King, Dart's Imperial, Warden, Currawa, Major, Canberra, and the new crossbreds, Gallipoli and Graham.

On the irrigation area 190 acres are now in lucerne, and 45 acres in permanent pasture. The total area seeded in cereals, forages, and irrigated crops amounts to 1,040 acres. Sixty acres have been fallowed in preparation for next season's sowing.

The general condition of the live-stock on the place is excellent; 90 head of cattle and 1,174 sheep are being maintained on the pastures and forage crops.

The bulk farm flock of sheep comprise 980 crossbred ewes. These were mated with Suffolk and Border Leicester rams from the farm stud flocks. Lambing is proceeding freely, and to date 558 lambs have been dropped. The ewes put to Suffolk rams are lambing first. The stud Border Leicester and Suffolk sheep are doing well. There are now 132 Border Leicester sheep and 59 Suffolks.

The Red Poll herd is maintaining its condition. Thirty-six cows are now in milk. The cows have access to the lucerne pasture during the day, which provides a fair pick. In addition, they receive 15 lbs. of silage and 6 lbs. of bran daily during the milking. Lucerne hay is provided at night in special racks in a sheltered paddock.

Fodder reserves comprise 550 tons cereal hay, 150 tons of baled straw, 50 tons of lucerne hay, and 60 tons of silage.

All experimental plots have now been sown except those specially set aside for testing the effect of late sowing. The plots sown comprise the usual manurial, variety, selection, rate of seeding, and time of sowing tests for wheat. Rotation and green manurial tests have also been sown, as well as stud cereal plots and oat variety tests. In addition, a number of experimental plots have been sown to flax.

The experimental plots of sugar beet sown under irrigation have been lifted and topped—the season was not so favorable for this crop as that of last year.

FARMERS' CLASSES AT DOOKIE AGRICULTURAL COLLEGE.

The Council of Agricultural Education has arranged for a series of Farmers' Classes, extending over a fortnight, commencing on the 4th August, to be held at the Dookie Agricultural College.

The only charge for attendance at the classes will be £2, to cover board and lodging for the fortnight.

Railway tickets, at holiday excursion rates, will be issued from the home station to Dookie to those attending the classes, and vehicles will meet the train at Dookie to carry farmers to the College.

Forms of application, &c., may be obtained from the secretary of the Council of Agricultural Education, Public Offices, Melbourne.

The following is a list of the classes which it is intended to hold:—

Monday, 4th August, 1919—

3 p.m.	Mr. Gamble	Cultivation of Forage Crops	*L & D
4 p.m.	Mr. Gamble	Pickling Wheat, Barley, and Oats	D
7.30 p.m. ..	Mr. Richardson	American Agriculture (Illust.)	L

Tuesday, 5th—

8.30—9.30 a.m. ..	Mr. Gamble	Principles of Stock Judging	L & D
10.30—11.30 a.m.	Mr. Grant	Judging Dairy Cows	L & D
1—3 p.m. ..	Mr. Gibson	Farm Book-keeping	L
3.30—5 p.m. ..	Mr. Evans	Farm Engines	D
7.30	.. ..	Moving Pictures	

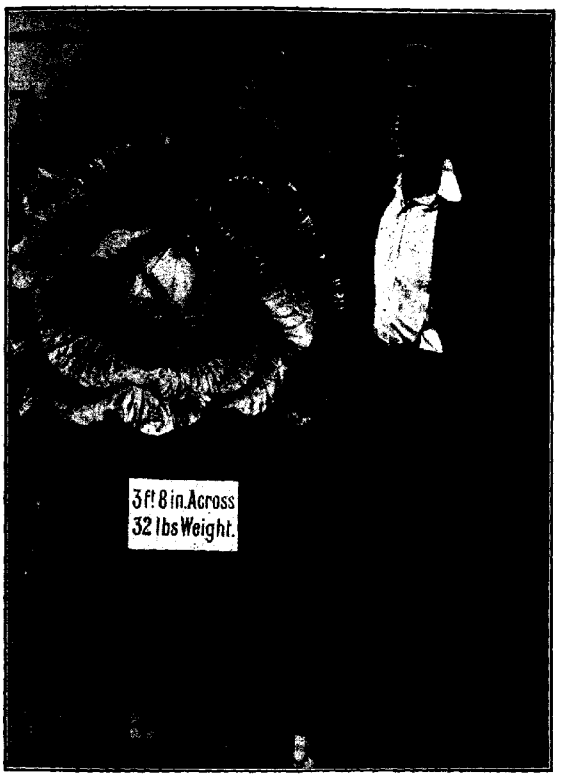
*L & D—Lecture and Demonstration.

Wednesday, 6th—			
8.30—11.30 a.m. ..	Mr. Ham	Sheep for the Farmer	L & D
1—3 p.m. ..	Mr. Archer	Feeding Dairy Cattle	L & D
3.30—5 p.m. ..	Mr. McLennan	Milk Testing	L & D
7.30 p.m. ..	Mr. Robertson	Contagious Diseases of Stock	L
Thursday, 7th—			
8.30—10 a.m. ..	Mr. Evans	Farm Engines	D
10.30—11.30 a.m.	Mr. Gibson	Farm Book-keeping	L
1—3 p.m. ..	Mr. Robertson	First Aid Treatment to Stock	L & D
3.30—5 p.m. ..	Mr. Wright	Farm Black-smithing	D
7.30 p.m. ..	.. ..	Debate	
Friday, 8th—			
8.30 to 10 a.m. ..	Mr. Simpson	Soil Physics	L & D
10.30—11.30 a.m.	Mr. Dowling	Poultry Feeding for Profit	D
1—5 p.m. ..	Mr. Marland	Feeding and Management of Pigs	L & D
7.30 p.m. ..	Mr. Ham	Management of Sheep (Illust.)	L
Saturday, 9th—			
8.30—11.30 a.m.	Mr. Pye	The Making of a New Wheat	L & D
Afternoon ..	.. ..	Football, Tennis, Golf, Rifle Shooting	
7.30 p.m. ..	.. ..	Concert	
Sunday, 10th—			
7.30 p.m. ..	.. ..	Church Service	
Monday, 11th—			
8.30—10 a.m. ..	Mr. Gibson	Mensuration and Surveying	L & D
10.30—11.30 a.m.	Mr. Adams	Building Construction	L & D
1—3 p.m. ..	Mr. Adams	Farmer's Tool Kit	L & D
3.30—5 p.m. ..	Mr. Gibson	Mensuration and Surveying	L & D
7.30 p.m. ..	Mr. Dowling	Poultry Management (Illust.)	L
Tuesday, 12th—			
8.30—10 a.m. ..	Mr. Kendall	Unsoundness of Horses	L & D
10.30—11.30 a.m.	Mr. H. Rowan	Judging Horses	L & D
1—3 p.m. ..	Mr. Davey	Insect Pests and Fungus Diseases	L & D
3.30—5 p.m. ..	Mr. Simpson	How Plants Feed	L
7.30 p.m. ..	.. ..	Debate	
Wednesday, 13th—			
8.30—10 a.m. ..	Mr. Drevermann	Weeds and their Control	L
10.30—11.30 a.m.	Mr. Davey	Pruning	L & D
1—3 p.m. ..	Mr. Ham	Preparation of Farmer's Clip	L & D
3.30—5 p.m. ..	Mr. Gamble	Principles of Ploughing	D
7.30 p.m. ..	Mr. Dowie	Politics for the Farmer	L
Thursday, 14th—			
8.30—10 a.m. ..	Mr. Ham	Sheep Dip and Dipping	L & D
10.30—11.30 a.m.	.. ..	Rope Making and Knots	L & D
1—3 p.m. ..	Mr. Simpson	Chemistry and Some Manures	L & D
3.30—5 p.m. ..	Mr. Richardson	Manures and Manuring	L
7.30 p.m. ..	Mr. Gamble	Farm Management	L
Friday, 15th—			
8.30—11.30 ..	Mr. Richardson	Factors for Successful Wheat Cultivation and Lucerne Cultivation	L & D
1—3 p.m. ..	Mr. Ramsay	Potato Culture	L & D
7.30 p.m. ..	.. ..	Social Evening	
Saturday, 16th ..	..	Free to Visit any branch of the College and Farm.	

Gymnastic Classes will be held in the Gymnasium every evening except Friday and Saturday.

CABBAGE GROWING AT FRANKSTON.

The cabbage illustrated in the accompanying photograph was grown by Mr. John Williams on his farm at Hastings-road, Frankston. It is of a variety known as "Succession," and was raised from American seed.



When sending the photograph, Mr. F. Johnson, the local dairy supervisor, wrote—

"Mr. Williams' land consists of poor heath country, but it is remarkable what can be grown on such land if it be fallowed and properly

worked and suitably manured. The fertilizer used by Mr. Williams on his crop of about 4 acres was blood and bone manure, which was applied at the rate of 4 cwt. to the acre.

"The weight of the cabbage in the photograph was 32 lbs., and it measured 3 ft. 8 in. across. While, of course, it is not typical of the crop, a great number of similar dimensions were cut, and frequently not more than four could be placed in a chaff bag. The average weight of crates containing four dozen of these cabbages was 560 lbs.

"Other places in the Frankston and Somerville district have given equally good yields. It is careful culture on patches having a good clay subsoil that enables the growers to bring such cabbages to maturity and perfection during the summer without irrigation of any sort."

DUAL-PURPOSE CATTLE.

The dual-purpose breeds of cattle are supposed to be good both for milk and for beef. Of course, the scawniest Jersey will produce some beef and the fattest Hereford cow will give some milk. But between these two extremes are a number of cattle which claim to be fairly good both for beef and for milk. Of these the most famous is probably the milking Shorthorn (says *Wallace's Farmer*).

About 200 years ago a Mr. Dobinson, who lived in the county of Durham, England (from whence the Shorthorns first came), brought over from Holland several bulls, which were very likely of the sort that are now called Holsteins.

Probably these bulls improved the dairy qualities of the original Shorthorn cattle.

At any rate, when one of the original Shorthorn improvers (Mr. Thomas Bates) began to work with them, he found a number of cows which were very excellent milkers as well as good beef animals. He liked the combination idea, and kept records both of the amount of beef and the amount of milk produced with a given amount of feed. To this day Bates' Shorthorns are noted for their milking qualities. After Bates' time the most popular of the breeders swung away from the milking idea for a great many years, but the common farmers, both in England and in the United States, depended very largely on the Shorthorn or Durham as a milk cow. Over half the milk in England is produced by Shorthorns. During the past 10 or 15 years there has been a great revival of interest among certain pure-bred breeders of the milking type, and to-day we have Shorthorns which have made records in milk and butter-fat that compare favorably with any breed. Some of the best have made records of around 20,000 lbs. of milk and 1,000 lbs. of butter in a year. The best type of milking Shorthorns is very similar in

general appearance to the Holstein except for the colour. They may be just a little finer boned and a little smoother, with a slightly greater tendency to flesh up easily.

But really the difference is more in colour than in anything else.

The milk of the Shorthorn cow will average nearly a half of 1 per cent. richer in butter-fat than the milk of the Holstein. The calves of the dual-purpose Shorthorn seem to rank just as well with the ordinary feeder as the calves of the more beefy type. At any rate, the ordinary farmer seems to fare just about as well whichever type he has.

The Red Polls stand out more distinctly as a dual-purpose breed than any other. They were bred originally in eastern England, about 200 miles south of where the Shorthorns originated. One hundred years ago, in this section of England, there were two types of cattle, one of which had no horns, and was of excellent dairy type. There was also a horned type, of rather small frame, bright-red colour, with a white or mottled face, much like the Hereford.

Gradually, the farmers of this section of England began to mix the two breeds, selecting all the time for solid red animals with no horns, which were good both for producing milk and beef. By 1862 it was realised that a new breed had been formed, and ever since then the new breed has given a good account of itself. Beginning with about 1873, the Red Polls have been brought over to this country in rather large numbers, although they are not nearly so popular as the dairy and beef breeds.

The ideal Red Poll cow looks very much like a good Shorthorn, being broad over the back, short-legged, deep in the chest, and with thick thighs, while at the same time the udder is of good size, and the cow possesses the ability to yield slightly more than the ordinary Jersey or Guernsey daily, her milk testing about 3.8 to 4 per cent. Red Polled steers have often been shown at the International, and have captured a few prizes, although they are ordinarily decidedly inferior to the true beef steers. The cows have been entered in competition with the cows of the strictly dairy breeds, and while they have made very good records, they have not surpassed the record of the Holstein, Jersey, or Guernsey. Everything considered, the Red Poll occupies a position very similar to that of the milking Shorthorn.

A third dual-purpose breed was developed about 150 miles west and a little south of where the Red Polls came from. They are much like the Red Polls, except that they have horns, are a little smaller, give a rather richer milk, and are finer-boned, with a rather deer-like appearance. The Devon at one time was very popular in the eastern States. To-day, however, we almost never hear of it as a beef breed or a dairy breed.

The Holstein, Ayrshire, and Brown Swiss have some claim to rank as dual-purpose breeds.

At any rate, the cows of these breeds, and especially the Ayrshires, fatten off very readily when dry, and the steer calves fatten off fairly well. The calves of the Brown Swiss are of good size, and bring more money as veals at an earlier age than almost any other breeds.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

PRUNING.

Pruning operations will now be in full swing. In pruning the young trees, heavy pruning will be required in order to produce strong growths and a good frame, but as the tree advances in age the pruning will be reduced considerably. It should be remembered that strong, heavy pruning results in wood growth, and that weak pruning steadies the tree, and promotes an even growth. When framing and building a tree, the former consideration is observed, and when the tree is coming into fruit bearing or is mature, it will be pruned according to the latter. Any operation that will cause the tree to produce less wood growth will induce the tree to become more fruitful, provided the tree be in a healthy condition; so that when trees are mature, pruning operations, as a rule, should not be severe, but rather the reverse.

Old fruiting wood, and dead and dying wood should always be removed, and aged spurs should be considerably reduced, in order to make them produce new growths. Crowded and overlapping laterals should be shortened back; fruit-bearing in the higher portions of the tree should not be encouraged; and due consideration should be given to the admission of light and air to all parts of the tree.

Where varieties of fruit trees are prone to bearing crops every second year, their lateral system should be pruned so that they will not produce too heavy a crop in the fruiting year; and at the same time they will produce wood in their fruiting year to give a crop in the subsequent season.

A model tree will always be light on its topmost leaders, bearing the major portions of the crop in the lower regions of the tree. The main point to be noted is that a heavy wood growth in the upper portion of the tree tends to reduce the bearing capabilities of the tree in its most useful parts.

DRAINAGE.

The rains of winter will always show the necessity for draining orchards. Where under-soil drains do not exist, the trees are bound to suffer. If the damage is not immediately apparent, it will be later found that in some way loss will accrue. Either the tree will be weakened by the loss of roots through rotting, or it will be devitalized so that it will not carry a satisfactory crop of fruit. Too often surface drainage is relied on to remove the so-called surplus water. There should be no surplus water for surface drains. The water is only surplus or excess when it is in the soil. Two circumstances, and two only, permit of surface drainage. First, when it is necessary to carry away excessive stormwater; and, second, when it is practically impossible to find an outlet for under-drains, owing to the low-lying situation of the area.

The term "surface drainage" does not apply to open drains, which, owing to their depth, act also as soil drains; neither does it apply to

graded surfaces which allow a more equitable distribution of water. Surface draining is usually applied to a system, whereby a considerable quantity of water is removed by gravitation before it enters the soil. Such a system cannot be too roundly condemned. As much water as can be obtained by natural means should be induced to enter orchard soils; and then whatever is in excess will be carried away by under drainage, provided that drainage, either natural or artificial, be in existence.

Where suitable drainage is not provided, the tree roots are compelled to remain in a few inches of surface soil. Their feeding area is thus extremely limited indeed; and when, at any time, rain-water does filter and penetrate through the soil, it carries with it the soluble and other plant foods, below the reach of the tree roots.

Soil ventilation is only possible with a system of drainage, and air is as necessary to the roots of a tree as it is to the foliage. By the removal of the surplus water and the consequent admission of air into the soil, the soil temperature is rendered far more equable, warmer in winter and spring, and cooler in summer; and such a change must be beneficial to the trees.

Drainage is thus an essential for all orchard lands. When natural drainage occurs, the orchardist is fortunate; but whether natural or artificial, a system of drainage will always materially increase the crop of fruit, strengthen the trees, and considerably add to their term of life.

Drainage schemes should be carried out at the present season of the year. In closed drains, such drainage media as cinders, charcoal, stones, brushwood, timber, logs, or tile pipes may be used, but the latter generally give more satisfactory and permanent results. They are also less liable to silting up than any other material.

Drains should be placed into the clay, if this be not too deep. In any case, they should be below any possible interference from cultivating instruments.

SPRAYING.

In order to keep in check such pests as Bryobia, scale insects, woolly aphis, and others, a strong and forcible spraying with lime sulphur or red oil spray should not be delayed any longer. The whole tree should be thoroughly wetted with the spray. A good, vigorous, and thorough winter spraying will place a large majority of the trees in quite a satisfactory condition of freedom from these pests for the whole year.

The lime sulphur spray is an excellent fungicide, and a strong winter spray will go a very long way in reducing any attack of the black spot fungus on either the apple or the pear. In addition, if the peach trees are sprayed at this time with lime sulphur, both peach aphis and peach leaf curl will be considerably minimised in the spring time.

Flower Garden.

Digging in the garden should be continued. Before digging, the beds should be given a top dressing of lime or stable manure, and subsequently these should be dug well into the soil. Care must be taken

not to injure the roots of any shrubs, trees, or roses. Root cutting and root pruning will always dwarf any plant. In digging, it is not wise to discard any leaves, twiggy growths, or weeds. Unless they are required for the compost heap they should always be dug into the soil. Leaf-mould is especially useful in any garden, and where such plants as Azaleas, Rhododendrons, Liliums, &c., are grown, or for pot-plant work, it is exceedingly valuable. In forming the compost heap, no medium whatever should be added to help the rotting down of the leaves unless it be a little sand. Any chemical added will render the mould unsuitable for its special objects. The plants mentioned above strongly object to lime.

All shrubs that produce flowers on their young growths, including roses, should now be pruned. Care should be taken to distinguish between those shrubs that flower on the new wood and those that flower on the wood of the past season's growth. Those that flower on the new wood, and may now be pruned, are Lasiandra, Lantana, Cestrum, Tecoma, Hydrangea, Plumbago, Erythrina (some species), &c., and those that should not be touched at present time are Spirea, Erythrina (some species), Pyrus Japonica, Weigelia, Prunus pissardi, P. Vesuvius, P. mume, Deutzia, Polygala, Ceanothus, &c. It is a safe rule in pruning shrubs to wait until they have flowered before pruning. This will certainly give the shrubs a somewhat ragged appearance in the winter, but it is the only way to secure the best flowering results.

All herbaceous plants, such as Salvia, Aster, Delphinium, Polygonum, Boltonia, Gaura, and Chrysanthemum, should be cut back, and, if necessary, lifted and "heeled in" in a temporary location for the winter. Plant out early Gladioli, Iris, and Liliums.

Continue digging, manuring, and trenching.

Vegetable Garden.

Seedlings from boxes or seed plots may now be planted out. Care should be taken that all vegetable beds are well raised and thrown up. By throwing up the soil, and thus deepening the paths and the spaces between the plots, the latter are well drained, and the soil is made considerably warmer. This will greatly facilitate the growth of the young plants.

Asparagus may be planted; sow seeds of carrots, parsnips, cauliflowers, onions, peas, broad beans, and tomatoes, the latter being forced on in a frame, so as to obtain good plants quickly.

HIGH COST OF SPRAY MATERIAL VERSUS CONTROL OF ORCHARD PESTS.

The high cost of products in general has met with no exception in the case of materials used for insecticidal and fungicidal purposes. While we have no proof that high prices of such materials have tended to decrease the efficiency of spraying, there is every reason to believe that such is the case. Those who are most familiar with spraying practices know that there is often too much of a disposition on the part of the orchardist to economize in material and, as a result, his efforts

to control a certain insect or disease may be in vain. That the high prices which prevail at present result in a greater tendency to economize in material and a consequent lessening of efficiency, is a reasonable supposition.

In all spraying there is nothing of greater importance than thoroughness of application of the spray material. Insect pests of all kinds, but especially the scales and aphids, breed very rapidly, and the nearer one can come to killing 100 per cent. when spraying, the better will the spraying pay. On the other hand, a very large percentage, for example, 80 or 90 per cent. of the individuals of a certain pest may be destroyed, while the 10 or 20 per cent. remaining will in a few days' time reproduce to such an extent that the value of the spray will not be noticeable. In other words, a desire to save a small amount of spray material to lessen the cost of spraying an orchard may result in almost an entire loss of time, money, and labour utilized in making the application. If spray materials are high and the orchardist feels that he cannot afford to buy a sufficient quantity to spray the orchard thoroughly, he would do better if he would spray only half the orchard, using a sufficient amount of material per tree to get results, than to spray the entire orchard with only one-half enough material.

Therefore, no matter how high the price of insecticides or fungicides may become, a lesser quantity of dilute spray should not be considered. Instead, there should be some very careful experiments to determine the minimum strengths that may be used successfully.—*The Monthly Bulletin*, State Commission of Horticulture, California, U.S.A.

REMINDERS FOR AUGUST.

Live Stock.

HORSES.—The feeding and general management of horses recommended for July will also apply for this month. Horses, more especially young ones, running on low-lying country are liable to become affected with internal parasites. This will be recognised by the unthrifty and poor condition of the animals; in such cases medicinal treatment will be necessary. If the following lick be made available, it will not only be of great assistance in preventing serious invasion, but in cases where worms are not in large numbers, the repulsion of them from the intestinal tract will result:—

Lick.

20 parts salt.
10 do. lime.
1 do. sulphate of iron.

If possible, be with mares at foaling, so that the navel cord may be properly tied and thoroughly treated with antiseptic, and thus prevent that very fatal disease, navel or joint ill. Wash cord with one part of corrosive sublimate to 3,000 of water, and soon after paint with tincture of iodine. The iodine treatment must continue till the cord has completely dried up.

CATTLE.—Cows should still be rugged, but coverings should be removed frequently, in order to enable the animal to get rid of the old coat; or, better still, a good curry-combing may be given. Continue hay or straw. Look up treatment for milk fever in *Year-Book of Agriculture*, 1905, and treat cattle accordingly. Give calves a good warm dry shed. Give the milk to young calves at blood heat. Have feeding troughs or buckets clean. Don't over-feed. Feed regularly with regard to quantity and time. Provide a good grass run, or fine hay or crushed oats in a box or trough. Give a cupful of limewater per calf per day in the milk. The problem with many at the present time is how to rear calves without milk. This can be done very well by starting them on

new milk for a fortnight, and then gradually substituting the milk with one of the calf meals on the market. To these it would be advisable to add two or three tablespoonfuls of cod liver oil. The following meal is in general use in Ireland:—Two parts, by weight, of oatmeal, 2 parts maize meal, 1 part pure ground linseed, all finely ground. Scald with boiling water, and allow to stand for twelve hours. Start with new milk, then gradually substitute skim and ¼ lb. daily of the meal mixture per head per day, gradually increasing to 1 lb. or more. In a month milk may be dispensed with altogether. The crushed oats, fed dry, have been found to give excellent results.

PIGS.—Supply plenty of bedding in warm well-ventilated sties. Keep sties clean and dry, and feeding troughs clean and wholesome. Sows may now be turned into grass run. If pigs are lousy dress with kerosene emulsion or sulphur and lard, rubbing well into crevices of skin, and disinfect sties. Crushed wheat from Wheat Board is the cheapest food available now. Worms are very prevalent at present, and may be treated by giving 2 to 10 grains of Santonin in form of pill, or from half to one teaspoonful of oil of turpentine in milk or castor oil.

SHEEP.—Decide on the breed and number of ewes and rams required for the coming season. Place orders as soon as possible. Breeders can then give better satisfaction, and allot preference to the earlier applications. The result of mating should be given most careful consideration from a wool point of view. Evidence points to an extreme shortage of good merino and fine cross-bred wool for years to come. At the same time, a steadily increasing demand has set in for materials manufactured from these finer grades. The world's civilian requirements must be met, and for flannels and finer materials for temperate and cold climates these are indispensable. After all coarse wools have a limited use. Cull stud ewes carefully, especially merinoes, consider form as well as evenness of covering and style of wool. Discard for thin fribby forearms, for coarse common thighs, for mushy wasty undercovering, inferior patches across the shoulders, common and short between the hip bones. Individual merit must be considered first, pedigree alone is not sufficient.

POULTRY.—Yards should be turned over with a spade or fork, and sown down with rape or barley. Keep the breeders busy—straw litter with a little grain scattered about will make them exercise. Overhaul incubators; see that the capsule of thermostat acts properly; thoroughly clean lamps, egg drawers, and chimneys. Test machine for two days before putting eggs in. It is also advisable to have thermometer tested. When additional incubators are required, it is more satisfactory to keep to the one make.

Cultivation.

FARM.—Second fallow where necessary for summer crops. If required, roll or harrow crops. Plant very early potatoes in forward districts. Sow mangolds. Apply slow-acting fertilizers, such as blood and bone manures, for maize.

ORCHARD.—Complete planting and pruning of deciduous trees. Watch for peach aphis, and spray with tobacco solution, if present. Prepare for planting citrus trees. Spray for woolly aphis with lime sulphur or red oil spray.

FLOWER GARDEN.—Finish digging and pruning of roses, &c. Leave pruning of shrubs till after flowering. Keep weeds in check; weed out seed beds. Divide and plant out all herbaceous plants, such as phlox, delphiniums, rudbeckia, &c. Plant out gladioli. Complete planting of shrubs. Mulch young plants.

VEGETABLE GARDEN.—Top-dress asparagus beds; plant new asparagus plots. Plant herb divisions, and potatoes. Sow cabbage, cauliflower, peas, carrots, beans, radish, and lettuce seeds. Sow tomato seeds in a hot frame. Finish digging.

VINEYARD.—August is the best month for planting vines (grafted or ungrafted). This should be actively proceeded with and completed before end of month. Scions for field grafting may still be preserved as detailed last month, or better still by placing them in cool storage. They should all be removed from vines before end of month, at latest. Conclude pruning and tie down rods. Where black spot has been prevalent, apply first acid iron sulphate treatment. Owing to the dry spring, black spot was not in evidence last season. The fungus is not dead, but dormant, hence preventive treatment must not be neglected. Leaflets dealing with black spot and its treatment will be supplied on application.

Cellar.—Rack again, towards end of month, wines which have as yet only been once racked (spring racking). Fill up regularly all unfortified wines. Clean up generally in cellar and whitewash walls, woodwork, &c.